Contractors and Engineers Monthly

Vol. 35, No. 3 MARCH, 1938 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Radios and Snow Removal**
  The Washington State Department of Highways has found radio-equipped snow-removal units invaluable in its snow-fighting program, by keeping the main office informed of conditions on the state highway system and by making it possible to dispatch orders quickly and efficiently.
  See page 2.
- **Cotton in Road Work**
  Missouri's first experiments in the use of cotton-fabric reinforcing for roads led to some interesting and valuable discoveries as to how the work should be done for the best results.
  See page 2.
- **Unusual Wood Forms**
  Booth & Flinn devised some unusual collapsible forms to use on a series of large culverts involved in a large grading contract for a 4-lane concrete highway near Pittsburgh, Pa.
  See page 2.
- **Surface Treatment**
  A typical Alabama double bituminous surface treatment project was completed in the northwestern part of the state last summer.
  See page 5.
- **Cut-Back Tests in Field**
  Arkansas has developed a compact job laboratory to test residual solvents in cut-back used on dense-graded aggregate road-mix projects.
  See page 15.
- **Roadside Development**
  "Make Roadside Development Pay Its Own Way" is North Carolina's motto. The plan and regulations for its roadside development program are discussed in this issue.
  See page 25.
- **Earth Dam Creates Storage Basin**
  A new distribution reservoir for the Birmingham, Ala., industrial water supply project has been created by the construction of an earth dam, 75 feet high and 1,850 feet long, by WPA forces.
  See page 28.

IN THIS ISSUE

Batcher Set-Up	38
Bituminous Roads	1, 5
Bulletins and Pamphlets	42,43
Cartoon	4
Concrete Curing	21
Cotton Roads	2
County Road Work	1
Culvert Construction	2
Cut-Back Field Tests	15
Dam Construction	28
Editorial	4
Federal Aid	4
Highway Lighting	18
Legal Decisions	29
Levee Construction	32
Lock Construction	1
Roadside Development	25
Snow Removal	2
Under-Water Blasting	9

The Road Shaper Is the Secret of the Smooth Roads of Wayne County, Ind.

Smooth Surfaces With Road Shaper

Care with Base, Road-Mix And Surfacing Practiced by Ernest Coffin, Supervisor of Wayne County Roads

✦ THE USE of asphalt emulsion in road-mix surfaces and sealing them with a cheap waste sand are two of the fundamentals in securing a good secondary road, according to Ernest Coffin, Road Supervisor of Wayne County, Ind. But he goes a couple of steps further to make sure that the final surface is smooth. First he builds up the base and maintains it for a considerable period to insure a solid foundation, and the second insurance is the use of more than just blades to spread the road-mix after it is mixed. He spreads the material with a long-base road shaper that insures the ironing out of bumps without the need of blading them off later. Careful rolling completes the job.

Typical of the operations in Wayne County is the construction of one mile of the Wernley Home Road. The north

(Continued on page 12)

Handling Concrete And Panel Forms on Miss. River Lock 24

(Photos on page 44)

Central Engineering Co. Handles Details Well, With Art Cossens, Supt.; Big Ice Bill for Drinks

✦ IT is always hot in the hole, and down in the cofferdam for Lock 24 at Clarksville under a mid-summer Missouri sun was no exception. Central Engineering Co., contractor for this last of the locks on the lower Mississippi, took pains to see that the men had plenty of chilled, not iced, water to drink, and every one of the ten water boys carried a supply of the unfailing remedy for heat exhaustion, salt pills. Tepid water is unpalatable and water that has ice in it is too liable to upset a man in hot weather. To provide cold water that tasted good, a huge ice box was built with a coil of 2-inch pipe so arranged that four blocks of ice fitted inside the coil and half blocks of ice fitted around the outside of the coil. A full 4 inches of saw dust insulation protected the ice and coil from the blazing sun. The lead-in pipe was ¾-inch and a standard faucet attached to the end of the coil on the outside was used for filling the water buckets. The ice consumption averaged around 1,700 pounds per 24 hours with a maximum of 2,300 pounds. Some bill, but thirsty men don't work; they spend their time calling "water boy"!

The Project

The work at Lock 24 provides for a lock 110 feet wide and 600 feet long with an auxiliary lock for use when the water is the same elevation above and below the dam. A 30-inch interceptor of concrete pipe along the land-side wall will care for all the sewage and drainage water originating in Clarksville for the length of the wall and carry it well below the harbor which will be formed downstream by the land-side wall where it leaves contact with the shore for a considerable distance at its lower end. This, with a slight curve in the shore line, will permit the use of this area as a harbor for the increasing fleet of small craft that has come into existence with the creation of the various pools in the Mississippi River. A sluice gate in the guide wall near the upper end of the lock permits flushing the interceptor with river water to keep it clean. Above the intake for the flushing water the upper guide wall is backfilled to its full height with rock and earth, forming a well-drained backfill section.

The Cofferdam

Work on the cofferdam was started in August, 1936, with the driving of the outer and inner lines of steel sheet piling by floating equipment. Inland Steel Co. sheet piling was used in lengths from 16 to 65 feet with a uniform 19-⅝-inch web. The sheeting was driven with a McKiernan-Terry 9B3 steam hammer, using the longest lengths in the upstream river corner where the greatest trouble from scour was to be expected. Starting at the shore end, the sheeting was driven to rock but when this corner was reached driving was into shale but not to solid rock. When the water had been pumped down to Elev. 400 at the excavation for the foundation of the river wall, there was considerable leakage, even after the second line of sheeting had been driven 26 feet inside the outer line and backfilled by a suction dredge of the TriState Dredging Co. of Keokuk, Iowa. For about one half of the river side a third line of sheeting was driven, connecting two pump sumps to insure the integrity of the inside berm and check any tendency to blow in during high water.

This precaution was well taken as the March, 1937, high water was one of the unexpected incidents of all Ohio and Mississippi River work. The contractor had made his cofferdam 3 feet higher than required by the plans of the U. S. Engineer Department and then he had only 0.9-foot freeboard on the cofferdam. In fact, sand bags were used at one point where the sheeting had been driven a bit low. At the very worst of the flood the Superintendent was about ready to give the word to permit flooding the cofferdam by stopping the pumps as the 50-foot head on the hole

(Continued on page 17)

DISTRIBUTION RESERVOIR FOR INDUSTRIAL SUPPLY

The Dirt-Moving Fleet on the Dam for the 65,000,000-Gallon Distribution Reservoir for Birmingham, Ala. See Page 28.

"Calling All Snow Plows" In State of Washington

Two-Way Radio Aids Job of Shifting Plows By Reporting Storm and Snow Conditions

By HENRY W. YOUNG

(*Photo on page 44*)

✦ IN 1923, the Washington State Department of Highways made its first gesture at snow removal when it spent $7,000 for the purpose on a contract in Snoqualmie Pass east of Seattle. Contrast that with $201,960 spent in 1936. The department no longer hires the work done but instead Lacey V. Murrow, Director of Highways, has turned it over to J. D. MacVicar, Highway Maintenance Engineer. In winter, he mobilizes a great part of his department personnel for the purpose of snow removal, together with most of the trucking equipment to supplement the fleet of rotary snow plows. Even bulldozers and a specially equipped power shovel are brought into play. This whole army of men is then directed by means of radio, with two-way equipment installed both in field stations and on mobile equipment.

All this may sound odd to the people who have been led to look upon Washington as a state almost sub-tropical in climate and vegetation. This is true only in the western part and around Puget Sound. Indeed, certain parts of the Olympic Peninsular receive more rainfall than any spot in the United States. The Cascade Mountains, ranging north and south, begin not more than 100 miles from the coast. Winds carrying a tremendous moisture content, in attempting to rise and curl over them, in winter drop this moisture in the form of snow. Ten or 12 feet on the level in passes is nothing. Some of the drifts reach 40 to 50 feet in depth, and dangerous slides occur frequently. In spite of this, Snoqualmie, Chinook and Satus Passes are kept open all winter, while three others are worked on more or less regularly through the winter to facilitate earlier opening in the spring.

Men and Machines

Under Mr. MacVicar are six district maintenance engineers, five supervisors for each district and a force of 2,500 men normally. The heavy equipment available for their use consists of 420 1½ to 7½-ton motor trucks, 17 rotary snow plows, 5 tractors with bulldozers and one gasoline power shovel.

The procedure is similar to that in most areas subject to heavy snowfall, namely: light, fast trucks first, with moldboard plows traveling at 25 to 35 miles per hour; heavier trucks following and pushing the accumulations farther over on the shoulders with V-plows and wings; finally the rotaries, which are able to cope with depths up to 20 feet, to throw the snow clear off the roadway. In greater depths, as in deep drifts in mountain passes, this heavy equipment then actually takes the snow off in layers, traveling over a snow bottom. They work at the side of the bank mostly, taking it down in slices and throwing it over to the opposite side. They are also equipped with what are called rotars or diggers as a breakdown attachment. These diggers look something like an electric fan and are mounted on a boom above and to one side of the horizontal auger which draws the snow into the propeller fan. These diggers "paw" the snow down onto the auger.

It is an odd sight, also, to see a power shovel working on and in snow, yet the Washington Department of Highways uses one. The shovel shown in the illustration is moving along on a snow track in Snoqualmie Pass perhaps 10 feet up from the bottom of the drift. It would normally be fitted with a ½-yard dipper, but this has been replaced with one of special wide-bottom design of 4-yard capacity. The regular boom and dipper stick have also been replaced with others of extra length.

Snoqualmie Pass is about 40 miles long. The regular winter blanket there is 14 feet deep on the level, piling up to 50-foot drifts in places. At this point, when winter comes, there are regularly located four rotary snow plows on trucks, each with a 125-hp gasoline engine to drive the augers and diggers; five push-plow 3½-ton trucks; a sander truck; mechanic's car and the power shovel. Here is equipment to make the snow fly, sometimes at temperatures down to 30 below.

In the mountain sections, it is dangerous work. The real road is hidden from sight and it is possible to get off it and lose heavy equipment down the mountainside. In equipment for this service, Mr. MacVicar says that they look first for simplicity of design. Gadgets that add complication and may get out of order are frowned upon in snowdrifts miles from nowhere. All-around ruggedness and serviceability are also appreciated.

Use of Radio

Handling the whole snow-removal problem has been greatly simplified since radio was adopted in 1934. This arm of the service accomplishes two things in particular. It brings in exact information regarding storms, temperatures, snow depths, blockades, etc., to the central office in Olympia, which then can direct the men and trucks and transfer them from place to place speedily and intelligently. Secondly, radio reports the exact conditions at the fighting fronts, thus where necessary permitting the stopping or re-routing of traffic away from blockaded spots until they can be cleared. This may save thousands of

(*Continued on page 8*)

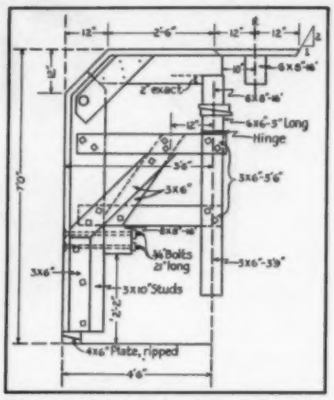


Diagram of One Half of the Collapsible Wood Culvert Forms

Novel Wood Forms For Culvert Job

Booth & Flinn of Pittsburgh Built Collapsible Forms for Large Concrete Box Culverts For Allegheny County

✦ A 3-MILE heavy grading contract for a new 4-lane concrete highway, to connect with State Route 51 leading to the Allegheny County Airport, was awarded to Booth & Flinn of Pittsburgh, Pa. A full quota of heavy grading equipment was placed on the job, including LeTourneau Carryalls, tractors and shovels. The novelty of the job, however, was the type of forms designed by the contractor for the large group of box culverts. This article is confined to the forms and work on Culvert No. 7 over Little Saw Mill Run as typical of the group.

The culvert is a 7 x 9-foot box 225 feet long with 14-inch walls, a 12 to 15-inch invert and a 14-inch deck with 12 x 12-inch fillets at the corners. The wood forms for this culvert were collapsible, 32 feet, 1¾ inches long and designed for seven pours. The sheathing was 2 x 8-inch tongue and groove lumber planed, with the 3 x 10-inch studs spaced 2 feet 3 inches and 8 x 8-inch wales 16 feet long. At the bottom of the 12 x 12 fillet the form was hinged on a 2-inch pipe.

A supporting column centered 4 feet 6 inches from the outside of the sheathing consisted of a 3 x 6-inch post 3 feet 9 inches long with a hinged block on top which was released from its vertical position when the pair of wedges holding the top block, a 16-inch 6 x 8, was knocked out. The column was held vertical by horizontal braces of 3 x 6's 3 feet 6 inches long bolted to alternate studs and in turn braced with diagonal 3 x 6's from additional blocks of 3 x 6's on one stud and an 8 x 8 block 16 inches long on the next stud. This block was held in place by a pair of ¾-inch bolts 21 inches long with the heads countersunk flat with the face of the sheathing.

The center top panel was independent, measured 24 inches wide and was mitered to fit tightly into the section of forms when placed. It was rigidly fastened to a 6 x 8 timber 16 feet long to prevent warping. This timber was supported by a 6 x 8 post jacked against it when the forms were set. Similarly the column for the side forms was supported by blocks and a jack to hold it firmly against the pressure of the concrete. The whole form was set on a 4 x 6 plate ripped.

The outside forms were built up of the same sheathing with 8-inch I-beams for studs and double 6 x 8 wales.

Concreting

A fleet of five 2-batch trucks hauled

(*Continued on page 14*)

Improvements in Use Of Cotton in Roads

Three Grades of Cotton Mesh Used on 2.7 Miles In Missouri; Asphalt Application Changed

✦ UPON the completion of the 13 miles of base stabilization with cut-back asphalt and some tar mixed by a Barber-Greene machine, the entire surface of the job between Keytesville and Glasgow, Mo., was armor-coated with pea gravel (C&EM Feb. 1938, page 2) and three special sections of 0.8, 0.9 and 1.0 mile were reinforced with fine, medium and coarse cotton fabric respectively. The results secured were not uniformly good but pointed to improved methods which were used on another later contract with great success. The methods are recorded here with the results and the improvements as a guide to others.

Unrolling the Fabric

A 1,600-gallon Etnyre distributor applied 0.12 gallon per square yard of RC-4 asphalt as the lower tack coat down the right-hand side of the road, using a 10-foot bar fanned to spread 11 feet wide. On this, one 90-inch bolt of cotton fabric was unrolled right to the edge of the road surface, leaving 42 inches of the RC-4 uncovered in the center.

As soon as the first strip of cotton was unrolled down the outside of the road, the contractor went back and unrolled the middle strip, lapping the first by 15 inches. This left one half of the middle strip free of the asphalt tack coat and the contractor reported it was difficult to hold the long "sheet" in place.

A light sprinkling of pea gravel was cast over the two strips of fabric so that the distributor could run down the road without disturbing the fabric. Then a second tack coat of 0.23 gallon per square yard was applied with the distributor using a 10-foot bar along the right-hand edge of the road. This still left some white edges which were visible when the road was completed. On another later contract this was corrected by shooting the asphalt 6 inches wide on the edge. Immediately following the top tack coat, 10-foot Buckeye spreader boxes attached to trucks were backed onto the surface, applying about 25 pounds of pea gravel per square yard. The gravel was spread uniformly by a rattan drag broom in the form of a V and then, where the gravel was thin, it was spotted by hand and hand-broomed. This was followed by one rolling with a 7-ton Hercules roller.

The entire operation was repeated from the left-hand side of the road with the bottom or first tack coat being applied over the half width of the cotton fabric in the center that had not received any bituminous material. It required considerable extra labor to keep the cotton fabric in place during the applica-

(*Continued on page 13*)

A Power Shovel with Special Snow Dipper Working in Snoqualmie Pass, Wash.

Still a "show street" after 9 years' hard wear

Traffic such as the above for a period of nine years is severe punishment for the best of pavements. In spite of it, the TEXACO Sheet Asphalt pavement on Main Street, Ashtabula, Ohio, is as smooth, easy-riding and good-looking today as ever. This continues to be a "show street" of the contractor who laid it.

Paving contractors everywhere east of the Rockies have found from years of experience that the TEXACO Asphalt pavements they lay today will be their "show streets" years from now.

TEXACO

ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City

Chicago Cleveland Kansas City Houston Dallas Buffalo Philadelphia Richmond Boston Jacksonville

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER OF THE CONSTRUCTION INDUSTRY

Issued Monthly by Buttenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City
Publication Office: Mount Morris, Ill.

TOM DIX.....President — THEODORE REED KENDALL.....Editor
EDGAR J. BUTTENHEIM.....General Manager — GEORGE CONOVER.....Vice President
MYRON MacLEOD.....Advertising Manager — HERBERT K. SAXE.....Treasurer

BRANCH OFFICES
Chicago, Ill., Daily News Bldg., Tom Dix, President
Cleveland, Ohio, 648 Hanna Bldg., George Conover, Vice President
San Francisco, Calif., Mills Bldg., Duncan A. Scott
Los Angeles, Calif., Western Pacific Bldg., W. H. Grubbs

Wanted—A Better Understanding Of the Compaction of Clay Soils

By C. A. HOGENTOGLER, Senior Highway Engineer,
Division of Tests and Research, U. S. Bureau of Public Roads

As yet there does not seem to be a sufficient understanding of the variable character of clay particles and the changes in size caused by manipulation of the soil and by chemical treatment. Inasmuch as clay is a common material in fills, a greater knowledge of its chemical and physical properties is essential to successful construction operations. I hope that this editorial discussion will aid those still finding difficulty in understanding the behavior of clay soils.

The first step in soil stabilization is to obtain a clear and coherent picture of the soil materials. The largest particles are gravel; smaller than gravel is sand; pulverized sand is silt; weathered silt is clay; smaller than clay are colloids and smaller than colloids are ions. These materials may be arranged in two fractions with respect to size, the fraction larger than two-thousandths inch, including the gravel, sand and silt, and the fraction from two-thousandths inch down to several billionths of an inch, which includes the clay, colloids and ions.

Gravel, sand and silt are ground by natural forces of wind and water to different sizes but may have the same chemical composition. They may be included with crushed rock and slag and then arranged in two groups; those which are very slightly soluble in water and those which are definitely insoluble. Limestone, slag and the like are sufficiently soluble that thin films of gelatinous cements are formed on their surfaces. Upon drying, these gelatinous films solidify and bind the particles together. Calcium chloride, sodium chloride and other chemical solutions increase the solubility of naturally soluble rocks and therefore release more gelatinous cement to bind the particles into stable masses. Therefore such aggregates, when properly graded and chemically treated, become highly stable under traffic.

Certain granites, on the other hand, are insoluble and will not form cements. Therefore, even with good grading, such aggregates are unstable unless improved with a small amount of soluble rock powder.

Clay and colloids result from the chemical action of weathering, plant growth decay and the like, and consequently may differ considerably in chemical composition from the parent rocks. Clay and colloids differ in another and very important respect from silt, sand and gravel in that they do not have definite grain sizes. Instead, the recorded grain sizes are not necessarily the sizes of individual particles but often are the sizes of aggregations of clay and colloid particles. The size of these aggregations may be changed by agitation in water, manipulation of the soil and by chemical treatment. Every time the sizes of the aggregations are changed, the physical properties of the clay are also changed. Therefore, the clay fraction must be considered as a material with exceedingly variable properties as compared with gravel, sand and silt.

Every particle of every fraction is electrically charged. However, gravel, sand, silt and clay sink through water so rapidly that their movements are influenced little or none by the charges. But colloids are small enough to remain in suspension sufficiently long for the electrical charges to influence their movements. When two colloids with the same type of electrical charges come into contact, they rebound from each other, since like charges are repelled. When colloids with opposite charges collide, they adhere to each other and form flocs, which become heavy enough to settle to the bottom of the suspension and form sediments.

Shrinkage and Swell

The principal considerations in soil stabilization is to provide treatment or admixtures to reduce the shrinkage and swell of soils. The shrinkage and swell are due to the fact that there are two types of water: that which adheres to wet surfaces and that which drips off. We can not explain the adhesion of surfaces and films any more than we can explain the attraction of a magnet for iron. But we do know that powerful centrifuges exerting pulls of hundreds of thousands of pounds fail to remove films from wet soils. Therefore, we conclude that an attraction greater than these enormous pulls holds the films on the surfaces of the particles. The films must be held under correspondingly enormous pressures and, as a result, are more adhesive or glue-like than ordinary water.

Two things control film thickness: chemical composition of the particles; and the ions adsorbed on the surfaces of the particles. Colloids high in silica adsorb thick films; therefore, under conditions of alternate wetting and drying, such colloids undergo great volume change. Iron and alumina colloids, in contrast, have thin films and therefore represent soils which undergo very little volume change upon wetting and drying.

Like colloids, ions in water adsorb films on their surfaces. Thus the potassium ion, but eight-billionths inch in diameter, becomes associated with 16 molecules of water and grows to an apparent size of twenty-billionths inch. On drying, its shrinkage is relatively small. The lithium ion, in contrast, while but six-billionths inch in diameter, becomes associated with 120 molecules of water and attains an apparent size of thirty-nine-billionths inch. Therefore, on drying, the lithium ions shrink enormously. Between potassium and lithium can be arranged the other metallic ions. Therefore, a knowledge of the chemical composition of a soil is essential to a proper understanding of its reaction to the alternate wetting and drying to which most soils to be stabilized are subject, and to make possible the selection of the proper binder, stabilizing agent and method of manipulation.

The methods employed to stabilize film thickness, which in turn stabilizes the soil, include the use of admixtures and compaction. These admixtures include selected soils, deliquescent chemicals, solutions of electrolytes, soluble cementitious materials, primes and neutralizers and insoluble binders. The advantageous selection of an admixture and method of treatment depends upon a thorough knowledge of the chemical and physical properties of the soil to be stabilized.

Status of Improvement On State Highways

During the calendar year 1936, the state highway system mileage was increased 15,483 miles, in many cases due to state legislative requirements to take over an additional mileage each year from the counties, according to the annual report of the American Association of State Highway Officials. This increase is principally in 14 states. The total state system mileage on January 1, 1937 was 444,765 miles, which is 14.6 per cent of the total road mileage of the country.

Of the total state highway mileage on that date, pavements of all kinds totaled 120,216 miles, treated and low-cost surfaces totaled 122,633 miles and macadam, gravel and sand clay untreated amounted to 104,735 miles. This means that there is a total of 347,584 miles of surfaced highways in the state highway systems.

Delaware and Massachusetts are the only states reporting their entire state system dustless or better, although New Hampshire and Vermont are 100 per cent surfaced. Other states almost perfect in dustless roads are California and Maryland, with 99 per cent, and Connecticut with 97 per cent. Those reporting between 90 and 95 per cent dustless or better are Illinois, Indiana, Maine, New Hampshire and New York. There are 20 other states whose state systems are above 50 per cent dustless or better, but there are still 8 states with less than 25 per cent of their highways so improved.

British Roads Save Scenery and History

In England there is a strong body of opinion which demands that in the lay-out of new roads, and even more so in the improvement of old ones, every effort should be made to avoid the destruction of features of historic, archaeological and scenic interest, said Major F. C. Cook, Chief Engineer, Roads Department, British Ministry of Transport, in an address on highway design problems in Great Britain before the Canadian Good Roads Association.

The Ministry therefore does all it can to preserve trees, even at the cost of some adjustment of alignment, to border the roads by hedges instead of open fences, to plant trees and shrubs where it can be properly done, and to turf the roadside shoulder and the slopes of cuts and embankments.

Structures of historical interest are scheduled as "Ancient Monuments" by H. M. Office of Works and must not be interfered with for any purposes without their consent. Further, drawings of all new bridges are submitted for the criticism of the Royal Fine Arts Commission before they receive the Minister's approval.

"There are times," said Major Cook, "when restrictions of this nature seem unnecessarily irritating, but in calmer, and I trust normal moments, one recognizes that they have done something to raise the level of public taste, and to preserve the charm of the country which it is our duty and privilege to serve."

"We Saw Your Smoke Signals for Help and Came Right Over to Do Our Daily Good Deed!"

Proposed Federal-Aid Funds for 1940-1941

Congressman Cartwright has introduced in the House of Representatives a bill (H.R. 8838) which in principle is similar to the Hayden-Cartwright Act of 1936, proposing appropriations for highways for each of the fiscal years ending June 30, 1940 and June 30, 1941, as follows: regular Federal-Aid system, $125,000,000; secondary or feeder roads, $25,000,000; grade crossing elimination and protection, $50,000,000; forest highways, roads and trails, $14,000,000; Federal reservations other than forest reservations, $2,500,000; National Parks roads and trails; parkways to give access to national parks, monuments, etc., $10,000,000; Indian reservation roads, $4,000,000; and Alaska, $500,000.

Two additional sections to the bill are (1) that beginning with the fiscal year ending June 30, 1940, the District of Columbia shall be entitled to share in all sums authorized and apportioned to the states, and (2) "that after two years following the approval of this Act, the Secretary of Agriculture shall not approve any project submitted by any state under the authorizations made in Sections 1, 2 and 3 hereof, unless and until, in the interest of safety, he shall find with respect to such state that it has enacted and is enforcing major requirements of what, in the judgment of the Secretary, constitutes an adequate uniform code for safety in the operation of motor vehicles, particularly with respect to the licensing of drivers and the operation of such vehicles."

Senator Carl Hayden, ranking member of the Senate Committee on Post Offices and Post Roads, introduced a bill in the Senate (S-3309) which, with the exception that no specific amounts are stipulated, closely follows the provisions of the House bill.

According to a report from the American Road Builders' Association, the hearings on Congressman Cartwright's bill before the House Road Committee have been some of the most interesting in the history of Federal-Aid for highway legislation. A considerable amount of factual information vitally important to those working for the continuation of the highway program was recorded at these hearings. The printed report of the Committee hearings will be released in a few days.

Double Treatment For Road Surface

Mitchell Bros. Completes 6-Mile Alabama Contract At Winfield; Small Slips Stopped by Gravel Cover

✦ THE excellent bituminous highway system which Alabama is building to eliminate the gravel road includes many miles of the double bituminous surface treatment which has stood up so well under traffic and weather conditions in that state. Mitchell Brothers of Birmingham, Ala., completed several contracts of this type in Alabama during the 1937 construction season. Typical is the 5.942-mile FAP 115, Reopened, between Guin and Winfield. This work involved some grading for relocation and several small slides that were handled with gravel blankets.

Grading

There was 189,236 yards of common excavation in the contract, most of which was removed with a LeTourneau 8-yard and another 12-yard Carryall scraper pulled by Caterpillar Sixty and Eighty diesel tractors. The maximum haul for the dirt was 2,800 feet with an average of 800 feet. The free-haul limit in Alabama is 1,000 feet. The fill was spread and rolled in 8-inch layers, using two 12-ton Buffalo-Springfield steam rollers for the compaction. A Lorain 77B shovel was used for a few of the heavier cuts and for loading the gravel out of a local pit for the base.

Slopes on cuts up to 6 feet are 10 to 1 up to 2 to 1 and 2 to 1 up to 1½ to 1 for the higher cuts. Fill slopes vary from 10 to 1 for light fill up to 2 to 1 on the higher ones. In spite of the slopes selected, three cuts, two 12 feet and the other 6 feet in height, slipped because of unstable stratified material near the bottom of the slope, a silty clay and kaolin, known locally as "jug mud." The slides were cut back to 1½ feet below the subgrade and 8-inch clay bell and spigot tile put in with open joints 2 feet below the toe of the excavation. The trench was backfilled with sand and gravel and the material continued up the slope with a maximum thickness of 10 feet where the unstable layer was the worst and had to be cut out for some distance back from the toe of the original slope.

All 3 to 1 and lighter slopes are sodded in cuts and all slope fills. Sod 4 inches thick and 1 foot wide is put in in continuous rolls with one foot spacing between the horizontal strips. Commercial fertilizer with a composition of 4:8:4 is applied at the rate of 600 pounds per acre and later, when the grass has started to grow, 300 pounds of nitrate of soda per acre is applied.

Preparation of the Base

Twelve inches of loose gravel with a mixture of sand-clay, known as Class B base in Alabama, was spread and compacted under traffic with constant blading for sixty days. After placing the 12 inches of gravel it was thoroughly mixed on the road with an International Harvester gang plow and a gang disc of the same make. It was then shaped with a Galion E-Z lift 14-foot blade, a Caterpillar grader and a Caterpillar No. 9 patrol with a 14-foot blade. The shaping was to a template. The gravel base was watered day and night for 10 days, in the absence of rain, and then permitted to dry before the application of the prime. The minimum compacted depth of the gravel base was specified as 8 inches and a test pit was dug every 100 feet in the road to check. At every 500 feet a base sample was taken and sent to the laboratory at Montgomery for testing. This was in addition to the regular daily testing of the material at the pit by a field laboratory. Where unstable material was encountered for a distance of 2 miles, an additional thickness of 8 inches of loose gravel was put in below the regular base.

The gravel sub-base was laid down from 30 to 38 feet wide and was carried down the slope to the full width, forming excellent side drainage. This base was primed 22 feet wide. Mitchell primed about one half of the length of the job at one time, using his Kinney 850-gallon distributor mounted on a Mack truck. The priming material was a TC-3 tar applied at the rate of 0.32 gallon per square yard at 125 degrees F. The tar was supplied by Koppers. Immediately following the prime the surface was covered with a light layer of hand-cast sand and traffic permitted on the base at once. The sand prevented picking up of the tar by tires. On the second half of the Mitchell contract the prime was allowed to dry for 8 days and then traffic permitted to use it for two days before the next step was undertaken. This was possible because a good detour was available.

C. & E. M. Photo
Gravel Blanket Was Used to Check Slip of Bank at Winfield, Ala.

Asphalt and Slag Laid Down

The primed base was cleaned of all loose material by a rotary broom mounted on an Oliver tractor with a blower. This was followed by the application of AC-10, an asphalt of 160 penetration at a temperature of 325 degrees F., using a 20-foot spray bar on the distributor.

(*Continued on page 40*)

A Power-Packer Installed in the Cab of a Snow-Plow Truck

Low-Cost Hydraulic Power for Snow Plows

When a truck driver is sent out with a snow plow, he has about all he can do to handle the truck without taking time to crank a snow plow up or down. For this reason Blackhawk Mfg. Co., 5535 W. Rogers St., Milwaukee, Wis., has developed a simple easily-operated remote-control hydraulic unit for raising and lowering snow plows. This unit, called the Power-Packer, is an adaptation of a Blackhawk pump, with a convenient handle having a modern all-tight grip similar to a gear-shift lever, which operates in two directions. There is no danger of accidentally lowering the load by pushing the handle of the Power-Packer sidewise, because it just can't be done. The positive release valve for lowering the load is an all-tight lever located at the end of the Power-Packer, making it possible to release the load at any position, regardless of the position of the pump handle. The degree to which the release valve is open controls the speed of lowering the plow.

The complete Power-Packer is installed on the floor of the cab and the head may be placed in any one of twelve positions to bring the release valve and handle at the most convenient angle for the truck operator. This unit is operated entirely by hand and requires no attachment to a power take-off or other portion of the truck. The oil line outlet is located at the top of the unit and connects directly to the ram which controls the position of the snow plow.

A New Truck-Mixer

The latest model in the series of Transit truck mixers made by Transit Mixers, Inc., 75 West St., New York City and first exhibited at the Road Show in Cleveland, follows the general design of previous models but in addition contains a number of improvements.

This new mixer employs a centralized control from which the driver can control all the functions of the mixer, and a new discharge door speeds up discharging and also gives improved control for partial discharge into small forms. Another new feature is the water-control device, manually set for the introduction of any desired amount of water into the mixing drum and thereafter functioning automatically. The water pump is capable of discharging up to 75 gpm into the drum, speeding up injection and also furnishing ample pressure for efficient flushing and cleaning of the drum after the concrete has been discharged.

The discharge heads are of the Transit quick-replaceable type. Three point suspension is through an exceptionally heavy-duty railroad-journal-type double-row non-adjustable Timken bearing in a self-aligning housing. Permanent concentricity of the drum-bearing track, drive gear seat, discharge door and front-end bearing mounting is assured through the machining of all these parts at one time in a single lathe operation.

Literature describing and illustrating these truck mixers may be secured direct from the manufacturer.

Two-Stage Air-Cooled Portable Compressor

A new line of two-stage air-cooled portable compressors in 105, 160 and 210-foot capacities, all in streamlined housings with the muffler in a streamlined case, has been announced by Le Roi Co., Milwaukee, Wis. These Airmaster compressors, mounted on four pneumatic tires with the latest type of spring hangers and heavy-duty multiple-leaf springs have automotive steering, with a spring-mounted pintle-eye towing tongue permitting fast traveling. The heavy tool lockers are welded sheet metal located

The New LeRoi Two-Stage Compressor

inside the housing. The sliding service doors go up inside the housing so they are out of the way when the machine is in operation. There is a hose reel for 50 feet of ¾-inch hose on each side of the 8-cubic foot capacity welded steel air-receiver, each with a lever-handle air valve.

The units are powered with 4-cylinder Le Roi valve-in-head engines. Twelve-volt electric starting systems are available as optional equipment. The instrument panel contains three buttons to operate the switch, choke and electric starter and four gages showing the air pressure and the oil pressure in both the compressor and the engine, and an ammeter.

The compressor has two low-pressure and one high-pressure cylinders, giving 2-stage compression, air-cooled with a ball-bearing-mounted fan operating in a shroud. Each cylinder is equipped with air-intake and air-exhaust valves, any of which can be taken out without removing the cylinder head. The engine is equipped with a diaphragm-type carburetor slow-down operating through the governor. A relief valve on the intercooler takes off pressure when the engine is idling, permitting the engine to accelerate to the governed speed before it starts to pump air. Both the engine carburetor and the compressor intake are equipped with oil-bath air cleaners.

Ruddon Elected President Of Federal Motor Truck

M. L. Pulcher, who has been President of Federal Motor Truck Co. since its formation in 1910, has resigned from that office and the Board of Directors unanimously elected R. W. Ruddon as his successor. Mr. Ruddon has been Vice President and General Manager of the company for the past 10 years. He was with General Motors Corp. when executive offices were first established at Detroit, left that company to go to Michigan Copper & Brass Co. and subsequently joined Federal in 1914 as Secretary to the General Manager.

Book on Reinforced Concrete Pavements

The structural design and analysis of concrete pavements and pavement bases are the subjects of a new book "Reinforced Concrete Pavements" by Royall D. Bradbury, Engineer-Director of the Wire Reinforcement Institute.

After an introduction on the subject of concrete as a paving material, stresses in concrete pavements; the structural design of concrete pavements and pavement bases; a comparison of plain and reinforced pavements; designing, detailing and specifying welded wire fabric reinforcements for concrete pavements; and the installation of wire fabric in concrete pavements are discussed. Two appendices contain A. S. T. M. standard specifications for welded steel wire fabric and of cold-drawn steel wire for concrete reinforcement.

Copies of this book "Reinforced Concrete Pavements" may be secured from the Wire Reinforcement Institute, National Press Building, Washington, D. C.

New Hercules Dealers

The Hercules Co., Marion, Ohio, has announced the appointment of the following new distributors to handle the sales of Hercules road rollers in their respective territories: Blaisdell-Folz Equipment Co., Cincinnati, Ohio; Quinn R. Barton, Inc., Jacksonville, Fla.; Southern Tractor & Equipment Co., Atlanta, Ga.; and Road Builders Equipment Co., Memphis, Tenn.

Radios Prove Aid In Snow Removal

(*Continued from page 2*)

dollars on the part of trucking companies and the traveling public in the case of a single big slide or tie-up. Over Snoqualmie, the average daily travel is 10 stages, 300 freight trucks and 1,200 passenger cars. Before radio, if the Pass was stopped up for even 24 hours, veritable caravans would be waiting at the entrances, or turning back, at great waste of time, for it must be remembered that on the occasion of a big storm or slide the telephone lines are usually down.

At each of the six district offices is a fixed radio station of 160-watts capacity. There are nine field stations with 10-watt sets, while 10-watt, two-way stations are installed on fifteen pieces of mobile equipment, mostly the rotary snow plows. The transmitters on the plows are of special design to withstand low temperatures, and the antenna has to be of especially rugged design to withstand the rigorous conditions. The 10-watt sets have a sending radius of approximately 100 miles.

The cost of installing a two-way radio station on a snow plow, based on Seattle prices the latter part of 1936, is as follows:

Transmitter	$425
Receiver	48
Motor-Generator	112
Antenna	50
Labor & Misc.	86
Total	$721

The 160-watt fixed stations cost approximately $2,000 and the fixed 10-watt stations $500. Ten-watts capacity for the field and mobile stations was adopted because the Federal Radio Communications Commission permits the operation of such a station by a man holding only a third-class license. The regular field men and snow-plow operators can be trained to handle the radio end with the simple equipment along with their other duties, saving the expense of an operator.

As pointed out by the Department, the cost of a mobile station is comparatively little. On a single tie-up in the mountains, the cost to the public, in being held back or re-rounted, may well equal the whole cost of the radio at that point. Furthermore, aside from the advantage to the Department in distributing its men and equipment to the best effect over the State during a general storm, they work much more efficiently after they get to their stations. Both directing heads and operating forces are now in constant communication. Conditions are reported exactly, more equipment rushed in if necessary, spare parts ordered and in a score of other ways the work speeded up in transforming mighty drifts into sparkling, silvery aisles down which traffic may buzz along, giving little thought to how they were made possible.

Two New Blade Graders

Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis., has just announced the new 110 and 112 drawn blade graders for use under any conditions where a crawler tractor can secure traction and which have been tested for the past year on all types of work under the most severe working conditions.

A tubular frame, designed to provide the greatest maximum strength per pound of metal, affords the operator greater visibility, greater blade control and better performance, according to the manufacturer. Cast steel is used for the parts requiring unusual shape. The circle-lift, circle-side-shift, frame-lean and wheel-lean motions are accomplished through the use of worm-and-gear-actuated cranks and connecting links. The long rear axle gives the machine outstanding stability and allows the operator to control the weight of the frame to give greater stabilizing force. The operator's spring-mounted platform is maintained level, even if the rear axle is inclined on a 25-degree slope. Pneumatic tires are optional, the same size tires and wheels being used on both front and rear.

Complete information on these two new graders may be secured by interested contractors, state and county highway engineers direct from the manufacturer.

Ornitz Made President Of Power Piping Division

W. P. Witherow, President of the Blaw-Knox Co., Pittsburgh, Pa., has announced the appointment of N. B. Ornitz as President of the Power Piping Division of the Blaw-Knox Co., and of W. N. Quartz as Vice President in charge of operations. Mr. Ornitz, who is a director and vice president of the Blaw-Knox Co., will also continue the management of the National Alloy Steel Division of that company.

Barge Canal Rock Coming Out Fast

Dunbar & Sullivan Co. Drill, Blast and Dig Oswego Branch Of Famed Canal in Western New York

By C. H. JOHNSON

✦ A FINE example of both dry land and submarine drilling and blasting procedures is found in the work of Dunbar & Sullivan Dredging Co. on Contract U. S. 14 between Fulton and Minetto on the New York State Barge Canal. Drilling in the dry behind a cofferdam with hand-hold hammer drills, punching down 6-inch holes with a modern well-drill, or drilling in from 10 to 12 feet of water with a modern drill barge Earthquake all are included in the various types of rock excavation along this contract's 7 miles of canal.

The stretch of canal included in the Dunbar & Sullivan contract lies between Lock 2 at Fulton, N. Y. and Lock 5 at Minetto, N. Y. This 7-mile length was divided by the engineers into eight sections, in which the yardages of earth and rock excavation were estimated as shown in the table on page 41. All of this is rock section, where the channel has been excavated in the natural bed of the Oswego River, with the exception of a stretch of about a third of a mile in Section 4, where the Barge Canal cuts through a sharp bend in the river, forming what is known as Battle Island Cut. In widening the latter, a considerable yardage could be excavated most conveniently by well-drill blasting. Furthermore, the contractor found it both expedient and economical to cofferdam one section of the canal and excavate there in the dry. Thus, besides the submarine work, done by drill barge, which is accounting for much of the rock excavation in the remaining sections, Contract 14 offers two other varieties of drilling and blasting methods, which makes it an unusually interesting project.

Equipment Used

The three types of rock excavation can thus be considered separately. But first, it will be well to enumerate the equipment which Dunbar & Sullivan is using on the work. The dipper dredge Empire, captained by Martin Welch, is the mainstay of the earth and rock moving fleet. With its 7-yard dipper it commonly loads out 3,000 cubic yards, scow measure, per day. The derrick boat Dunbar, mounting a 6-yard clamshell bucket, is an important factor in the work. The Monighan dragline Celt and Bucyrus-Erie dragline Cuilene Rhue, which is Gaelic for Red-Headed Girl, each swing a 4-yard bucket from a 100-foot boom and together add greatly to the ability of the fleet to load or cast as desired, under any and all conditions. The little floating crane Kerry Gow with its 1-yard clamshell bucket can serve a variety of purposes, but on this job has acted principally as a coaler.

All submarine drilling is done by Captain Jack Hasset's Earthquake, a drill-boat of Dunbar & Sullivan's own design, which deserves a far more extended and detailed description than can be given here. Along one side are mounted four Ingersoll-Rand H-64 steam drills, designed for this special purpose.

These machines together can and do commonly put in 500 feet of 4¼-inch hole in eight hours, where the holes range from 6 to 10 feet deep and where the work is not too scattered. The drill frames have been mounted in such a way that they move very quickly and freely along the length of the boat. An ingenius system of steam and water pipe connections permit all four frames to move the entire length of the runway so that they all can be concentrated at one spot if desired.

The Barge Empire Loading Rock to a Dump Scow

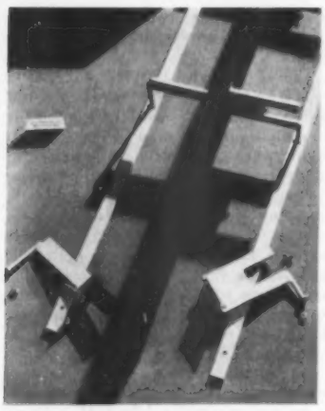
A departure from common practice and one which appears to have greatly reduced drilling cost and delay from breakage is the adoption of heavy walled steel tubing in place of regular hollow drill steel for the greater portion of the drill rods, only a few feet of drill steel being left above the bits. Welding and special clamps, furthermore, have eliminated some of the screwed connections that formerly were a source of trouble, above and below the water-head.

Two tugs, the steam-powered Sachem and the diesel-engined Spalpeen II, handle the scows and move the other units of the fleet as desired. There are two 500-yard and two 300-yard dump scows besides three flat scows for fuel supply.

The sweep raft, 120 feet long, is a craft with few pretensions to beauty, but an important unit and well designed for its unique purpose, that of checking up on the work of the dredges. Moored at the upstream end of the area to be swept, the barge is easily pulled back and forth, dropping downstream its own length with each sweep. Hanging centrally under it, at any desired depth below the surface, are four steel rails, controlled by winches, which signal to the watchers on deck the presence of any high spots left by the dredges. The sweep raft is in charge of Willett C. Griffin.

Completing the fleet, except for row-boats and a couple of boats with out-board motors, are the John C II, a diesel-powered tender, and the Roshar. The John C II has such duties as moving the sweep raft about the job or transporting men and supplies. The Roshar is Superintendent A. J. Griffin's runabout,

(Continued on page 26)



The New Godwin Load-Transfer Truss

New Unit Flat Dowels For Highway Joints

Reinforcing for load transfer at concrete expansion and contraction joints varies from the tin-capped round dowels used in many states to elaborate steel structures designed by a few highway organizations. The two prime factors in successful load transfer are (1) a type of reinforcing that will not be misaligned when installed and (2) a structure easily installed by not more than two men.

W. S. Godwin, President, W. S. Godwin Co., Inc., Baltimore, Md., has given this problem considerable thought and has developed a simplified rigid structure which meets the requirements of state highway departments and has been approved by the U. S. Bureau of Public Roads. The Godwin load-transfer truss requires only one man to handle a 10-foot joint weighing only 40 pounds with its continuous supporting channels, which grip the ground and prevent its being displaced by the load and blow of the concrete dropped upon it.

The Godwin pre-formed expansion joint consists of a pair of steel dowels 6 inches long, 1 inch high and 3/8 inch thick, spaced 1½ inches apart, and connected by two welded plates forming a socket into which a 9 x 1½ x 3/8-inch doweled plate fits snugly. The 9-inch dowel carries a plate 2½ inches high which rests against the pre-formed expansion joint material or other form of joint material and is placed at such a point that the end of the dowel in the socket leaves a space in the socket the same width as the expansion joint. When assembling this load-transfer truss, a light wing nut is used to hold the 9-inch dowel in its proper position. After installation, if there is further contraction, the light threads holding the wing nut are stripped, but as it has already performed its function no damage is done.

These load-transfer trusses may be supported by stakes of one kind or another, but Mr. Godwin has developed a simple fool-proof supporting frame which becomes an integral part of the dowel assembly. Rods are welded to the 9-inch dowel and to the lower 6-inch dowel and threaded at the bottom end so that they may be bolted with ¼-inch nuts to 1 x 3/8-inch 18-gage channels which have been previously punched on a jig. With the legs of the channel turned down a real grip is secured on the subgrade, making the assembled unit practically immovable.

The entire simple load-transfer truss, which has undergone extensive comparative tests in the University of Maryland laboratory, is built to sell at a cost comparable to the average steel assembly now used at contraction and expansion joints. Full details may be secured by writing to W. S. Godwin Co., Inc., Baltimore, Md., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

One of the New Sauerman Heavy-Weight Crescent Scraper Buckets

Drag Scraper Model Added by Sauerman

Several new models of Crescent power drag scraper buckets have been added to the line of buckets manufactured by Sauerman Bros., Inc., 464 So. Clinton St., Chicago, Ill. The line now is divided into five main groups: Lightweights, for handling loose sand and gravel or other materials weighing up to 100 pounds per cubic foot; Heavyweights, for handling materials weighing up to 130 pounds per cubic foot; Mammoths, for excavating or material-handling projects involving huge yardage; Bulldogs, for handling blasted rock and similar rough heavy materials; and Coalers for handling coal.

The accompanying illustration shows the new design adopted for the 1/3, ½ and ¾-cubic yard Heavyweight Crescent buckets. This is believed to be the first use of an arch-type bail on scraper buckets of these small sizes.

Pneumatic Equipment

A new 12-page catalog describing and illustrating C-P portable compressors, stationary and utility compressors, drills, demolition tools, wagon drills, clay diggers, sump pumps and similar contractors' air-tools, has recently been issued by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City. Copies may be secured direct from that company or any of its branches.

Large Compressor Unit Readily Transportable

A new side-by-side air compressor of 315-cubic foot capacity with a short turning radius has been announced by Davey Compressor Co., Inc., Kent, Ohio. By utilizing the Davey patented V-belt drive, a unit 127 inches long, 58 inches wide, and 30 inches high has been created.

It follows a general streamline design and mechanically utilizes all of the patented Davey principles of air-cooled air, and also marks the first appearance of a new belt idler, which automatically provides for the take-up of all sag in the V-belt drive.

A.S.T.M. Cement Standards

The American Society for Testing Materials has issued a compilation for the first time of all A.S.T.M. standard specifications and test methods pertaining to cements. The specifications, which are in a convenient form, cover portland cement, high-early-strength portland cement, natural cement and masonry cement. The methods of testing involve chemical analysis, compressive strength of mortars and fineness.

The Manual of Cement Testing which is included emphasizes certain factors which are considered important and which are sometimes overlooked. The recommendations supplement the physical tests, and suggest procedures found satisfactory and conducive to greater uniformity. This 96-page publication concludes with a selected bibliography of literature on portland cement. Copies can be obtained from A. S. T. M. Headquarters, 260 So. Broad Street, Philadelphia, Pa., at $1.00 per copy.

Road Work in El Salvador

During 1937 work on highways in El Salvador, Central America, was intensified to an average monthly expense of about $40,000 and the employment of some 3,000 men, according to a report from the American Consulate General in San Salvador. Work began last month on the remaining stretch of the Pan-American Highway from San Salvador through San Vicente and San Miguel to the Honduranian border, as well as on another stretch through Chalatenango and Ocotepeque to another point on the border.

Good Roads Built In Indiana County

(Continued from page 1)

½-mile section was widened by acquiring more right-of-way alternately on either side and laying down a new center line in the real center of the right-of-way so that a number of minor turns were ironed out. The grading and the removal of a number of large trees was done as a WPA project, relieving the County of this expense. All the highway work, however, was done by the regular county forces.

The center line of the road being determined, about 300 yards of gravel per mile is laid down the center of the road and maintained for nearly a year, in most cases with blading three times a week. This insures a well-compacted base in which all the weaknesses have had a chance to show up before the surface is placed.

Just prior to the black-top work, the base is carefully shaped with a Caterpillar No. 10 patrol grader to take care of the heavier cutting, and the final smoothing is done with a Gledhill road shaper with a 24-foot runner. The road is shaped to a 2-inch crown for the 18-foot width. Then it is primed with 0.25 gallon of a slow-breaking asphalt emulsion per square yard, with some crude oil used with the emulsion to help the penetration of the base. The work is done with a rented distributor and the base is primed 20 feet wide. The road is closed for three days to all traffic.

Using an adjustable home-made spreader box gravel is spread 4½-feet wide and 7 inches deep in the center of the road. This gives 1¾ inches loose material over the entire 18-foot section when spread with the Gledhill road shaper. The screen analysis of the gravel runs from ¾-inch down to 10-mesh material. The spread material is then shot with 0.8 gallon of emulsion having 56 per cent asphalt and with a slow-breaking emulsifying agent. The entire 18-foot strip is mixed with a Caterpillar No. 10 motor grader and a Caterpillar 12-foot blade pulled by a Fifty tractor, running both down the road to move the material to one side and back and then to the center where it is flattened to 5 feet wide with the motor grader. It is then split with the same grader and laid out to 9 feet wide on each side to stakes set every 200 feet to guide the grader operator.

This surface is rolled with a 5½-ton Fordson roller, starting at the edge and allowing the outer roll to lap over 4 inches onto the shoulder, then working back toward the center with every roll lapped with the previous trip. The road is then closed overnight and the next day shot with 0.15 gallon per square yard of quick-breaking asphalt emulsion and covered with 12 pounds of pea gravel per square yard, cast from the tail-gate of a truck and rolled. The road is closed for at least two days and then opened to traffic. When the pea gravel is mostly whipped off to the edges by traffic, the edges are broomed by hand to get the pea gravel back onto the road and the surface is shot with quick-breaking asphalt emulsion at 0.1 gallon per square yard. Fine sand is cast onto the road surface from the tail-gate of a truck so as just to cover the surface of the road and fill all the voids. A large amount of this sand sticks in the surface, giving a very close texture surface without losing any of the non-skid qualities of the stone. The sand that is whipped off is allowed to remain on the edges or shoulder and, as it is a waste sand bought for the lowest price, the loss of the material is not extravagant but rather a saving as it does help to build up the shoulder close to the bituminous surface course which is only 1½ inches thick, thus preventing edge breaks.

C. & E. M. Photo

A Wayne County, Ind., Road with Pea Gravel Surfacing Before the Final Shot of Emulsion

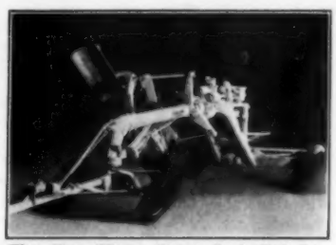
Organization

Wayne County, Ind., has 750 miles of road to be maintained in a county of 380 square miles and the total budget is only 48 cents per mile of road per day. Of the total mileage only 49 miles is surfaced with black top and there is no concrete road in the county system.

The improvement and maintenance of county roads in Wayne County, Ind., is made possible by the very close cooperation of the County Board of Commissioners with the County Highway Supervisor. The Commission sees to it that the Highway Department has all necessary tools, equipment and materials to do its work. This, with a well-organized interested group of employees, makes for economical and efficient work. The Board of Commissioners consists of: Newman Mendenhall, Hagerstown, Ind., President; George Davis, Williamsburg, Ind.; and Henry Patti, Richmond, Ind.

New Power-Controlled Drawn-Type Grader

An entirely new model heavy-duty tubular-frame power-controlled drawn-type grader has been announced by W. A. Riddell Corp., Bucyrus, Ohio. The machine is a refinement of the Model G 10-foot tubular-frame drawn grader which Riddell has sold during the past three years.



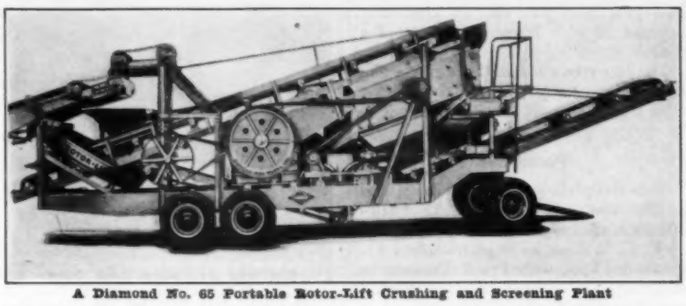
The New Warco Power-Controlled 10-Foot Blade Grader

The type of frame permits an unobstructed view for the operator as well as allowing an exceedingly high lift on the blade. The blade can be placed in an erect position at the side of the machine, and also can be turned over on top of the frame. This power-controlled grader has leaning wheels, a steerable tongue and laterally shifting rear axle. It is controlled by a sturdy gasoline power unit.

Rotor-Lift Feature of New Aggregate Plant

A comparatively recent innovation in material handling in aggregate plants is the Rotor-Lift method employed on the new Diamond anti-friction Rotor-Lift portable aggregate plants manufactured by the Diamond Iron Works, Inc., Minneapolis, Minn.

The Rotor-Lift, which is an inclined rotating pan operating on a 33-degree angle and at 10 rpm, eliminates the use of bucket elevators or long conveyors for returning the material to be re-crushed, thus making possible a portable plant shorter and lower than the conventional models. The Rotor-Lift is supported on trunnion wheels and is gear driven. A short conveyor receives the material from both the jaw and roll crusher, discharging it onto the lower part of the Rotor-Lift. This unit, which is steel lined, slowly revolves, carrying the material up to the main plant conveyor where it is automatically discharged by gravity.



A Diamond No. 65 Portable Rotor-Lift Crushing and Screening Plant

This plant, which consists of a Diamond roller-bearing jaw crusher, a roller-bearing roll crusher, a vibrating screen, the Rotor-Lift and the necessary conveyors, is electrically welded throughout. Goose-neck frame construction permits a shorter turning radius and shorter wheelbase, and three-point suspension for the entire plant eliminates frame stresses due to uneven ground. A swivel drive on the field conveyor permits feeding from any angle within 90 degrees on either side of the plant. There is a large storage hopper over the truck-loading conveyor and a hinged frame on crushings and truck-loading conveyors for increased portability.

Copies of Bulletin D-37-G, describing and illustrating the No. 65 Rotor-Lift aggregate plant may be secured direct from the manufacturer by mentioning this magazine.

Cotton for Roads Used in Missouri

(*Continued from page 2*)

tion of the bottom tack coat and even then it did not seem to stick sufficiently to the road surface. This was corrected later by applying the tack coats successively across the road and always laying the laps from right to left on top of the lower tack coat.

The method described was used for 2 miles. For the last 0.7 mile traffic was kept off the road and the tack coats were applied first on one side and then on the other edge and finally along the center so that the middle strip of cotton fabric acted as a roof lapping over both the side strips. By running the distributor down one side to apply the lower tack coat and then up the other side, the work progressed quite rapidly and a similar method was used in spreading the pea gravel, by running down one side and then back on the other side.

Results

The surface was not a great success on this project as the cotton fabric in all meshes was readily visible through the pea gravel over considerable areas throughout the project, due to insufficient asphalt used for the upper tack coat. It was intended to apply a total of 0.35 gallon per square yard for the combined tack coats by using the 0.12 in the lower tack coat and the balance, 0.23 in the upper. This made no allowance for the asphalt that was absorbed by the cotton fabric itself and resulted in the failure of the pea gravel to stick to the fabric and the road surface over the considerable areas. Later this was corrected by using the 0.12 for the lower tack coat and then the full 0.35 in the top tack coat, resulting in a well-bonded armor coat with no raveling of the surface and no exposure of the fabric.

The sections where the cotton fabric reinforcement started and stopped were apparent in the appearance of the road surface as the lack of asphalt in the surface made it lighter. The contract following this one in which the experience gained was used is described in another article to appear in a later issue.

Personnel

The contractor for the entire 13 miles of machine-mixed stabilized base between Keytesville and Glasgow, Mo., FAP 288-A, E, C and D, was S. G. Hayes & Co. of Jefferson City, Mo. Charles Chockley was Superintendent for the contractor. On these projects, N. F. Tamm was Project Engineer and C. W. Eshbaugh, Inspector, for the Missouri State Highway Department.

Wire Rope's Natural Enemies

A new constructive booklet on the many things which wear out wire rope and how either to avoid them or minimize their effect has recently been issued by the Hazard Wire Rope Division, American Chain & Cable Co., Inc., Wilkes-Barre, Penna. Sheaves, reverse bends, kinking, whipping, abrasion and many other enemies of wire rope are discussed separately.

Of particular interest to wire rope users is the four-page supplement in this new booklet which deals with the actual money value of keeping accurate records to wire rope service. In addition to explaining how such records indicate ways to make shut-downs less frequent, the book carries several Service Record forms for use in keeping track of wire rope service.

Copies of this well-illustrated and interesting 28-page pocket-size booklet may be secured by interested readers direct from the manufacturer by mentioning this magazine.

C. & E. M. Photo
Pouring the Walls and Deck of Culvert No. 7 on the Booth & Flinn Job

Novel Culvert Forms

(*Continued from page 2*)

the dry material for the culvert to the Ransome 27-E paver set near the culvert so that the P & H crane could readily swing the 2-yard bottom-dump bucket from beneath the paver chute to the form being poured. One skip man unloaded the batch trucks while the paver operator attended to the mixing and dumping of the mixes as called for by the concrete crew. One bucket man at the paver was required to spot the bucket there while three were required on the forms. The concrete crew had three spaders and one man on the Vibrospade which instead of being operated from its own generator was run by electricity brought in with blasting wire from a nearby store.

The concrete was handled quickly and easily and dumped from the bucket against a 45-degree baffle to direct it to the proper place in the forms.

Personnel

This complete grading, drainage and paving contract amounting to $814,063.20 in the original bid was in charge of K. C. Warner as Superintendent for Booth & Flinn, with Frank Transou as Assistant Superintendent. Joe Weixel was Resident Engineer for Allegheny County on the contract.

A New Road Joint

The Bethlehem road joint, recently announced by the Bethlehem Steel Co., Bethlehem, Penna., is of the slip dowel type and makes use of a tubular dowel of triangular cross section. The dowels are all shop-welded to the steel base and an angle bar is welded to the top of the dowels to stabilize the unit and assure fixed position. A feature of this unit construction is that it eliminates the necessity of assembling and adjusting road joints before concreting and insures their accuracy through all phases of handling before installation, according to the manufacturer.

The joint filler with its removable cap, which maintains the straightness of the filler pieces, is quickly added to the doweling unit. Two men can easily pick it up, or one man can handle it alone, put it in position and set it securely with special removable pins. The dowels are 10 inches long, and all ten dowels and the base rest on the subgrade. The steel base, 4 inches wide, extends as a

The New Bethlehem Road Joint

continuous piece beneath the joint the full width of the slab and turns up 10 inches at the outer edge. This is designed to make a positive continuous seal around the joint.

Hydraulic Brakes, No Mechanical Links

The rectangular multi-stage diaphragm of Linderman Devices, Inc., 149 Broadway, New York, N.Y., when applied to hydraulic brakes, offers numerous advantages, such as uniform brake pressure over the entire surface of the brake band and the elimination of all mechanical links in a hydraulic braking system. With this device heavier motor vehicles are as easily braked as 1-ton trucks.

A Linderman brake assembly contains four brake shoes with a multi-fold diaphragm under each shoe. The brake lining is presented to the drum in four directions, providing a contact of friction surfaces in exact conformity to the condition of distortion or wear.

The brake-operating device is a single-acting pressure pump mounted vertically or horizontally immediately beneath the brake pedal. The vertical position avoids possible leaks of stuffing box adjustments and if desired the direct foot application may be supplemented by any type of booster or power unit.

Multi-stage diaphragms are also applicable to clutch releases and many other services on heavy construction equipment. Literature describing the application of the Linderman multi-stage diaphragm will be furnished on request by the manufacturer.

A series of tests made in Missouri last summer to test the efficiency of base stabilization by sub-oiling with various bituminous materials will be described in our April issue.

Cut-Back Field Test Improves Road-Mix

Arkansas Develops Field Equipment for Tests, Sets 8 Per Cent Limit Of Solvent When Rolling

By E. L. WALES, Acting Engineer of Materials and Tests, Arkansas State Highway Commission

✦ EARLY in the construction of road-mix surfaces with dense-graded asphalt cut-back mixtures in Arkansas, it was found that the solvent content of the mix should be reduced to a minimum before rolling if satisfactory results were to be expected. This minimum is a point at which the solvent content is just enough to give the mix sufficient workability to allow spreading and rolling. The maximum allowable amount has been placed at 8 per cent of solvent by weight in the bituminous part. This percentage is arbitrary, and further experience may bring a change. However, this figure has give satisfactory results thus far in our work in Arkansas.

With the decision to reduce the solvent content to a fixed amount before spreading and rolling came the need for field equipment to determine quickly and accurately the percentage of solvent in the mix. After considerable experimental work in the laboratory, a distillation apparatus was developed which is simple in design and operation, is inexpensive and may be easily moved. With this apparatus the bituminous mixture is distilled in a current of steam, the solvent is condensed and separated from the water.

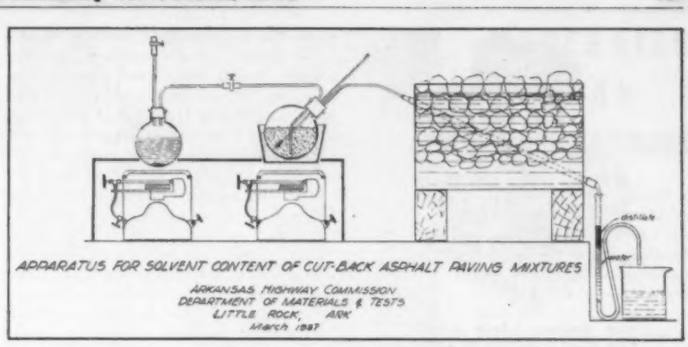
The Still

The still consists of a steam generator, distilling flask with sand bath, condenser, burette for receiving distillate, and two heating units. The steam generator is a short ring-neck round-bottom flask of 2-liter capacity, fitted with a two-hole rubber stopper, a steam escape valve, and a tube for connection with the distilling flask. The distilling flask is a short ring-neck round-bottom flask of 3-liter capacity, fitted with a three-hole rubber stopper, a steam distilling tube which connects to the steam generator and will reach to within one inch of the bottom of the flask, with an outlet tube for connection with the condenser and a thermometer with a range of 200 to 500 degrees F.

The sand bath is an ordinary iron cooking pot. The condenser consists of a sheet metal cooling bath and a ⅜-inch copper tube set at an angle of approximately 75 degrees from the perpendicular. The heating units are Jiffykook gas stoves. The burette has a capacity of 25 cubic centimeters and is connected with a rubber tube which keeps the distillate at a constant level to prevent overflow. All steam tubes are glass and connections are made with rubber tubing. The steam generator and distilling flask are supported on a sheet iron stand.

The Test

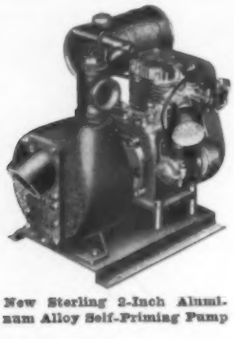
In making the test for solvent content, the apparatus is assembled as shown in the sketch and a sample of approximately 1,500 grams is weighed into the distilling flask. The end of the steam delivery tube and the thermometer bulb are placed within about 1 inch of the bottom of the flask. The temperature of the sample is raised to approximately 140 degrees F. and steam applied. Heating is continued until the temperature reaches 400 degrees F., at which point it is held until distillate ceases to be driven off. The time required after the temperature reaches 400 degrees F. is approximately one hour for MC cut-backs and fifteen minutes for RC cut-backs.



APPARATUS FOR SOLVENT CONTENT OF CUT-BACK ASPHALT PAVING MIXTURES

ARKANSAS HIGHWAY COMMISSION
DEPARTMENT OF MATERIALS & TESTS
LITTLE ROCK, ARK.
March 1937

After all distillate has been driven off, the steam is cut off, the stopper is removed from the distilling flask, and the flask is left in the sand bath until the sample has dried to a constant weight. The sample is re-weighed and the total loss computed. The weight of distillate is computed from the volume measured in the burette. With this information the per cent of solvent and the per cent of moisture by weight in the sample is known. With a sample from a mix containing a known amount of cut-back, the percentage of solvent remaining in the bituminous part can readily be computed with the knowledge secured by this test.



New Sterling 2-Inch Aluminum Alloy Self-Priming Pump

Self-Priming Pumps Of Aluminum Alloy

In order better to meet the demand for self-priming pumps that are readily portable and yet of sturdy construction and capable of pumping large quantities of water, Sterling Machinery Corp., 411-15 Southwest Blvd., Kansas City, Mo., brought out new 2-inch and 3-inch aluminum alloy pumps and its new 3-inch pump made of wear-resisting, close-grained, nickel semi-steel.

The new positive-driven shaft seal requires no attention except lubrication once a season with ordinary engine oil, according to the manufacturer, and larger air handling capacity and faster priming with higher efficiency are incorporated in these lightweight pumps.

New Diesel Line By General Motors

The General Motors Sales Corp. has announced the establishment of mass production and sale of small lightweight 2-cycle diesel engines for all purposes. Until now, General Motors has limited its diesel activities to the building of larger 2-cycle engines of from 600 to 1,200 hp. The new engine extends this line in varying sizes down to a 1-cylinder 22-hp model.

The announcement comes from the Diesel Engine Division, General Motors Sales Corp., Cleveland, Ohio, that these small model diesel engines and generators will be produced as "packaged power" units in either stationary or portable models, which can be quickly set up to power small industrial operations, irrigation projects, parking lots and other developments. Also, the engines can be employed for any direct-drive prime mover operations, such as tractors, hoists, trucks and pumps. The complete line of General Motors diesel engines, ranging from 22 to 1,200 hp, will be built in such a manner that additional horsepower can easily be obtained by the use of additional units.

The engines will be built in three General Motors factories at Detroit, Cleveland, and LaGrange, Ill. The new factory of the Detroit Diesel Engine Division was placed in operation in January simultaneously with the announcement of the enlarged diesel activities of the company, and will produce the smaller engines with from 22 to 160 hp and with from one to six cylinders.

The Cleveland Diesel Engine Division of General Motors, formerly the Winton Mfg. Corp., will manufacture a full line of medium-size engines, ranging from 200 to 400 hp, and a new engine factory at the Electro-Motive Corp.'s diesel locomotive plant at LaGrange will be in operation within a few months manufacturing the larger engines.

New Sales Manager For Air Cooled Motors

L. J. McLaughlin, who has had a wide and varied experience in industrial selling, has joined the Air Cooled Motors Corp., Syracuse, N. Y., to take charge of its field and distributor sales of Franklin Aircooled industrial engines and power units.

With the appointment of Mr. McLaughlin, R. E. Fowler who has temporarily been handling sales in addition to advertising and publicity will resume his duties as Advertising Manager of the company.

C. & E. M. Photo
Forms Were All Made in Heavy Panels

Work Well Handled On Miss. R. Lock 24

(*Continued from page* 1)

looked a little too much, and the danger of water breaking in at the bottom was imminent. All came through safely, however. The cofferdam was 1,500 feet long and 375 feet wide, inside dimensions.

When it came time to remove the third line of sheeting the task was not easy. It always happens that the clean-up is the slowest part of the job. The contractor's Bucyrus-Erie 50B steam crane with a 75-foot boom was run up to the fourteen piles that were to be removed and the Vulcan 800 extractor put into action. After 12 hours of effort with a jetting pipe running full force to loosen the piles, only two piles had been budged, the others remaining as though they intended to make it a life job. Eventually all but eight piles in both sumps and connecting line were pulled. The remaining eight piles were burned off.

Unwatering the Hole

The unwatering of the hole was done with two vertical Dayton-Dowd 12-inch electric-driven pumps swung from frames and lowered as the water fell. These same pumps were installed in two large sumps at the upper end and the mid-point of the river side and to which the other small pumps delivered water from trenches and other excavation.

Along the deep section at the outer upstream corner of the cofferdam four rows of Moore wellpoints were installed, using a maximum of 300 points with four and five Moretrench pumps attached, delivering about 4,000 to 5,000 gallons per minute from the wellpoints and keeping the water from rising in this section of deep excavation. The line of points turned the upper corner of the cofferdam and extended about 1,000 feet downstream. Auxiliary pumping equipment for the smaller holes included a number of Rex 4-inch centrifugals, some Novo diaphragm pumps and several Jaeger 2-inch Sure-Prime pumps. When used for the pumping of the sumps the two Dayton-Dowd pumps were equipped with float switches for controlling the cut-in and shut-off.

As soon as the cofferdam had been unwatered, the excavation was turned over to the subcontractor, Sammons, Robertson & Henry of Huntington, W. Va. Wagon drills and jackhammers were used for the drilling of the shale which was a maximum depth of 15 feet at the river bank where excavation for the guide wall and land-side lock wall was carried on. The material broke readily, requiring less than ½ pound of dynamite per yard of rock shot and the material broke up so as to be easily handled by the shovels and clamshells.

During excavation there was one bad spot. At about the mid-section of the land-side lock wall there were evidences of an old slide and as the railroad that brought all the aggregates to the job ran over a section of that slide it was watched most carefully. At times the overburden slid downhill at the rate of ½ inch a day but fortunately the weather was dry during the excavation of this section which greatly slowed up the rate of the slide. Timber shoring was used successfully to prevent sliding of the bank proper.

Heavy Panel Forms Used

The panel forms for the lock walls were made up 20 feet square on an average but were cut up considerably as the work progressed to make them fit the odd-sized and odd-shaped places. The 3 x 8-inch studs were spaced on 18-inch centers and 1½ x 6-inch square-edge sheeting lined with ⅛-inch tempered Masonite was used for the face. Some of the lining lasted for as many as fifteen pourings while portions were used only a few times. The wales on these 20 x 20-foot panels were double 10-inch channels with 2-inch pipe spacers between to allow for the 1½-inch tie rods spaced 8 feet maximum on centers. The tie rods were run through 2-inch pipe

(*Continued on page* 30)

Despite the 1,500,000 Yards of Material Which Came Down into the Highway Near Los Angeles Last Fall, a New Roadway Was Pushed Through in 12 Working Days. An Allis-Chalmers L-O Tractor and Bulldozer Are Shown Clearing Away Debris Near the Riverside Viaduct Which Was Destroyed by the Slide.

First State-Installed Highway Lighting in Ill.

The first safety highway lighting system installed by the State of Illinois was dedicated on December 16, 1937, at Park Ridge, about 20 miles northwest of Chicago, at a hazardous intersection and curve on U. S. Route 12. This project is an example of cooperation between the state and a community, as the state financed the installation of the system and will pay the maintenance costs while Park Ridge will pay for the power.

The curve at which this lighting system has been installed was previously very dangerous for night traffic, as indicated by its bad accident record. Seventeen accidents at that spot have been reported in the past few years, all of them occurring at night. Five of these accidents resulted in property damage only, the other twelve involving personal injuries and in ten out of the seventeen accidents the vehicle turned over. Illinois engineers have detailed records of motor vehicle accidents at the spot and know that the accident experience at the curve has been consistent as to time of occurrence, direction of travel and type of accident. With this background of statistical information, there is an excellent opportunity of studying the value of highway lighting in eliminating or reducing accidents.

In his dedication speech, F. L. Smith, Director of Public Works and Buildings for Illinois, said: "If the lighting proves successful and does cut the accident rate at the curve as we all hope it will and, I believe, know it will, highway illumination should play an important part in advancing our safety program.

"The fact that highway lighting is less expensive than modernization in some instances is another fact in its favor. For instance, here on Busse Highway, the elimination of the hazard by straightening the roadway and easing the sharpness of the curvature would have cost at least five or six times as much as the lighting system. As you know, it would have been necessary to acquire additional right-of-way in a subdivided tract, to reconstruct approximately a third of a mile of 60-foot pavement as well as the subsurface drainage facilities and intersecting street pavement.

"I am frank to tell you that if the illumination saves only one life, we shall feel that it has paid for itself."

Excavator Catalogs

The complete line of Hanson excavators, including the Model 33 ⅜-cubic yard machine, the ½-cubic yard Model 44, the ⅝-cubic yard Model 55, Model 66 with a ¾-cubic yard capacity and Hanson truck-mounted shovels and cranes in ⅜ to ¾-yard capacities, is described in a series of new catalogs recently issued by the Hanson Excavator Works, Tiffin, Ohio. With the exception of the ⅜-yard shovel, all of these units, including the trucks shovels, are available with gasoline or diesel power and all models are easily convertible for shovel, crane, dragline, clamshell, trench-hoe or backfiller service.

Any or all of these catalogs may be secured by those interested direct from the manufacturer by mentioning this magazine.

Devine Re-Elected Chairman

B. F. Devine of the Chain Belt Co., Milwaukee, Wis., was re-elected chairman of the Mixer Manufacturers Bureau at the annual meeting in Cleveland during the American Road Builders' Association Convention. The Bureau is now affiliated with the Associated General Contractors of America, Inc.

Hercules Cement Announces New Vice President for Sales

The Hercules Cement Corp. has announced the appointment of Donald S. MacBride as Vice President in charge of sales to succeed E. B. Goode, Jr., who recently retired because of ill health. Mr. MacBride will make his headquarters at 1700 Walnut Street, Philadelphia, Penna.

The Quadrant on the Koehring Longitudinal Finisher Used to Adjust the Crown of the Roadway

Longitudinal Finisher Improved Mechanically

The longitudinal finisher introduced by Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., only two years ago to do mechanically and without fatigue the work done by husky bull-float men has proved its value on many operations in insuring accurate work. By the use of template tracks, this machine maintains a theoretical cross section and also makes possible working concrete at the proper time in relation to setting.

The most recent improvement in this mechanical float is a device by which a uniformly accurate transition from a crowned cross section to a flat cross section on a super-elevated curve may be done mechanically.

The machine is stopped at the point of curvature and moved ahead 10 feet without operating the screed. Then, one-eighth of the crown is removed by an adjustment of one hole in the forward quadrant. The float is then run across the pavement and back if necessary and the machine again moved 10 feet ahead. This time another one-eighth of the crown is removed by a second adjustment of the forward quadrant and one-eighth of the crown is removed on the back quadrant. If the curve is of short radius and the transition is rapid, the adjustment is made in larger increments. Each hole in the quadrant represents a reduction of one-eighth of the crown, regardless of the length of the transition. Alternate adjustments of the front and rear quadrants gradually eliminate the complete crown and similarly again gradually replace the crown in the slab as the machine approaches the tangent.

Light-Weight Trucks For Heavy Services

A new conventional-type Model 750 truck and a Model 750T tractor have been announced by The White Motor Co., Cleveland, Ohio. These units are designed especially to meet the present demand for light-weight heavy-duty trucks and tractors, capable of handling maximum loads with a minimum chassis weight. The new model is particularly adapted for service on road building projects and for road maintenance.

Rated in the 4½-8-ton field and with a standard wheelbase of 136 inches, also with optional wheelbases up to 226 inches, the White Model 750 is powered by a new White 6-cylinder engine of 362-cubic-inch displacement with a bore and stroke of 3⅞ x 5⅛ inches. The 116-hp engine develops 280-pound-feet torque at 1,200 rpm. The engine, of the L-head type with a removable cylinder head, has a heat-treated counter-weighted 7-bearing steel crankshaft, dynamically and statically balanced. A vibrational dampener eliminates all torsional vibration.

Two exclusive White engineering features are incorporated in the new engine, the engine block and the intake manifolding design. In the engine, a new engine block design provides a special cooling system around the valve seats and valve guides, which practically eliminates the need for valve grinding. Also of importance is the streamline design of the intake manifold which provides a straight unobstructed passage direct from the central vaporizing zone to the cylinders, thereby greatly increasing the gasoline mileage and insuring better engine performance. The 362-cubic-inch engine is also the first White truck motor ever to be equipped with hydraulic zero-lash valve lifters. Through the use of these lifters, the valves retain a permanent adjustment throughout the life of the engine.

Full pressure lubrication is insured to all main connecting rods, camshaft, piston pin bearings, and timing gears through rifle-drilled passages. Squirt holes in the connecting rod below the piston skirt provide additional lubrication to the cylinder side walls.

The new White 750 is equipped with a dry single-plate clutch and a selective-type 5-speed transmission, direct in fourth. All of the gears are of carburized and heat-treated alloy steel. The unit also has a double-reduction full-floating rear axle with a one-piece cast housing. The cast-steel wheels are equipped with 9.00-20 tires, single front and dual rear. This model is equipped with four-wheel internal-expanding hydraulically-operated brakes.

The Model 750T tractor has the same engine and transmission as the truck model. For varying road conditions the tractor makes available either a single or double-reduction rear axle which is full floating. The rear springs on the tractor are of the slipper type, with a spring size of 50 x 3½ inches.

An International Highway Mower Cutting Grass on a Road Shoulder

Highway Mowing Units

International Harvester highway mowers for cutting grass and weeds along the roadsides are available in two types, the No. 30 mower for the International I-30 and Model 20 tractors and the No. 112-V mower for the I-12 and Fairway 12 tractors. They are compact power-operated units attached directly to the rear of the tractor so that mower and tractor form a single easily-maneuvered outfit controlled by the tractor driver. By operating through the power take-off shaft of the tractor, the mower is independent of ground traction. These mowers are quickly and easily attached and detached, enabling the tractor to be released for other work when desired.

Nos. 30 and 112-V mowers are available in 5, 6 and 7-foot cutting widths. Standard mower bars have steel guards spaced 3 inches apart. Two knives are regularly supplied with each mower. The units are built to close precision, of high-grade materials. The drive gears are accurately machined, fully enclosed and run in oil. The coupling bar is drop-forged steel, the cutter bar is heat-treated and oil-tempered, and various other parts of the mower are heat-treated or hardened to resist wear. A slight bend upward, permanently incorporated in the structure of the steel itself, is given the cutter bar, in order to counteract any tendency to sag when the bar is fully assembled and assures a flat bed for the knife to run upon even after years of hard service, according to the manufacturer. The knife runs on hardened steel wearing plates which are adjustable for wear. Another feature is the automatic pitman connection to the knife head, held in proper adjustment by spring tension. A pivoted toggle arrangement allows the pitman to operate without binding when the cutter bar is raised or lowered to extreme angles. Both of these mowers have a full vertical lift, making it possible to cut close to a pole, tree or other obstruction.

Safety features include a safety slip clutch on the power drive shaft to prevent slip and breakage should the cutter bar or other working parts become clogged. Another is the breakaway feature which allows the bar to swing back out of the way when an obstruction is encountered.

Complete details on these modern highway units are found in an 8-page booklet, copies of which may be secured direct from the International Harvester Co., 180 No. Michigan Ave., Chicago, Ill.

New Utility Trailer

A new light-weight utility trailer for the transportation of the lighter types of equipment, such as tractors, compressors, pumps and small shovels and cranes, has been announced by the C. R. Jahn Co., Builders Bldg., Chicago, Ill., manufacturer of heavy-duty machinery trailers.

This new trailer, which will handle loads of from 5 to 15 tons, has many new features. Dual-type wheels of heavily reinforced cast steel roll on oversized tapered roller bearings and are all equipped with heavy-duty full-balloon pneumatic tires. Either four or six wheels are available. To expedite loading machinery onto the low flat deck of the trailer, the entire front axle assembly is removable, accomplished by a unique arrangement at the front end of the trailer frame, which serves as both a connection and turntable for the front axle. A heavy jack screw has been built into the coupling assembly, making it possible to raise or lower the trailer frame to accommodate practically all jobs with safety.

Additional features which are standard equipment on this new model include adequate loading ramps, lash rings riveted to the side frames, reflectors, flag sockets and heavy-duty safety chains.

New Catalog Published On Contractors' Equipment

An attractive 32-page catalog, presenting the complete modernized line of CMC contractors' equipment and showing the manufacturing facilities and world-wide distribution and service organization of this company, has recently been published by the Construction Machinery Co., Waterloo, Iowa.

CMC concrete mixers, dual-prime pumps, hoists, pneumatic-tired carts, wheelbarrows, saw rigs and similar equipment are described and illustrated in this booklet "CMC Construction Equipment," copies of which may be secured direct from the manufacturer.

Concrete Curing Methods Tested

Waterproof Liquid and Paper Compared with Wet Sand for Oregon Highways

By N. M. FINKBINER, Engineer of Materials, Oregon State Highway Commission

✦ THE STANDARD specified method of curing concrete pavement in Oregon is the fine sand or earth covering, kept wet for a period of ten days. To arrive at a comparison of various curing methods, the wet sand covering was taken as the standard and two other methods, namely, the clear liquid waterproof covering and a waterproof paper covering, were compared to the standard in actual pavement construction.

The pavement was of 9-7-9-inch thickness laid in two 11-foot strips. The mix, designed by a modified Abrams method, contained 1.40 barrels of cement per cubic yard of concrete, with ½ to 1½-inch slump. The deposited concrete was struck off and compacted by a two-screed finishing machine, and a delayed finish was used throughout.

RESULTS OF CONCRETE CURING TESTS

	Wet Sand Curing (Standard)	Clear Liquid Waterproofing	Waterproof Paper
No. of cores	41	41	39
Age in days	70	70	70
Average core strength, pounds per square inch	4,814.5	4,284	4,253
Converted to 6" x 12", pounds per square inch	4,526	3,980	3,997
Per cent of standard	100.00	87.94	88.31

Alternating 300-foot sections were cured by each of the three methods until a total of 3,500 square yards of each type had been completed.

The sections which were wet sand cured were covered with damp burlap as soon as the burlap could be applied without marring the surface and left so covered for about 24 hours. The burlap was then removed and the high spots marked with a planometer and then cut down by a scraper float. Immediately thereafter, the pavement was covered with a fine sand and wet down by a tank truck traveling on the shoulder. The nozzle from the tank was a pipe swung out to the side with perforations so spaced that the 11-foot section of pavement could be thoroughly wet with one application. Applications of water were repeated at such intervals that the sand covering was kept wet for 10 days.

The sections cured by the clear liquid covering were sprayed as soon as the finisher was through brooming, and before the concrete had reached its set. Again, the next day after scraping, the pavement was given a final and complete covering with the compound.

The concrete cured with waterproof paper was left to harden until the paper could be applied without marring the surface. The next day the paper was removed until the necessary scraping was finished, then relaid, being careful to see that there were no wrinkles or raised places from which moisture could escape.

Cores, 5½ inches in diameter, were taken from the various test sections, and broken with the results shown in the accompanying table.

The fine sand used in the standard curing method had the following granulometric analysis:

Retained on	Single Sieve Per cent	Accumulative Per cent
¼"	0.2	0.2
No. 10	2.6	2.8
No. 40	21.8	24.6
No. 80	63.8	88.4
No. 200	6.6	95.0
Pass No. 200	5.0	100.00

New High-Pressure Triplex Road Pumps

The new Novo triplex high-pressure road pump has a water governor developed specially to provide a reliable relief valve to operate on low, high or intermediate pressure. When water is entirely shut off on the line it is discharged through this water pump governor at the pump under no pressure while the pressure remains in the pipe line.

Novo claims four points of superiority for this valve: 1. It unloads the pump and engine when no water is being used; 2. It reduces operating expense because the engine runs under no load when water is being discharged from the relief valve; 3. It operates at low pressure as well as at the highest or any intermediate pressure; 4. It lengthens the life of the pipe.

The relief valve of the Novo water governor is under no spring tension. It operates against the pump pressure through the action of a rubber diaphragm and a rod connecting these parts. When open, there is no pressure in the pump; consequently there is no chattering or hammering on the valve seat. When closed by the duplex spring action on the rubber diaphragm, the relief valve is held shut by the water pressure in the pump. The action of the relief valve is smooth and positive. A variation of 50 pounds in the pipe line, regardless of whether the water governor is set at 100 or 500 pounds, opens and closes the relief valve.

The new Novo triplex road pump has abrasion-resisting cylinder liners, automatic lubrication, V-type herringbone gears, ball-bearing high-speed shafts and stainless-steel plunger rods. The pump case is made up of two independent castings, the liquid end and the crankcase. This construction reduces replacement costs in case of freezing and cracking of the liquid end. The power unit is a heavy-duty 6-cylinder industrial gasoline engine with a 3-inch 7-bearing crankshaft, developing from 40 to 55 hp, depending on the speed. In line with the modern trend of diesel power this pump may be secured with a heavy-duty Caterpillar diesel 4400 4-cylinder engine.

This road pump is completely described in Bulletin No. 168-B which may be secured direct from Novo Engine Co., 216 Porter St., Lansing, Mich., by mentioning CONTRACTORS AND ENGINEER MONTHLY.

A Walter 10-Yard Diesel Dumper

Positive-Drive Trucks Now Have Diesel Power

The Walter ADV 150-hp diesel 10 to 15-ton capacity trucks, for use with dump bodies in heavy excavation and as tractors for heavy trailer service, recently announced by the Walter Motor Truck Co., 1001-19 Irving Ave., Ridgewood, Queens, L. I., N. Y., has the same four-point positive-drive system featured on all Walter trucks. With this system, positive driving action is obtained on all four wheels through the use of three automatic lock or torque proportioning differentials.

Power is furnished by a Cummins 6-HB 150-hp 6-cylinder diesel engine. The transmission is a unique tractor type, providing six forward speeds and two reverse, with a single gear-shift lever, with a high gear ratio permitting speeds of 30 miles an hour and a low gear reduction of 125 to 1 to meet emergency operating conditions. The intermediate speeds are closely spaced.

The chassis has a set-back front axle and the cab set well forward, to give a short wheelbase with the maximum space behind the cab. For dump service, the Model ADVD 126-inch wheelbase is used, with a cab-to-rear-axle dimension of 8 feet. For semi-trailers a shorter wheelbase, Model ADVT, of 114 inches can be furnished. This unit is equipped with 13:50-24 single front and dual rear balloon tires, giving a total tire capacity of 55,000 pounds.

2-Cylinder Gas Engines Added to Hercules Line

In announcing the new NX series of engines and power units, the Hercules Motors Corp., Canton, Ohio, has added two models of 2-cylinder heavy-duty units to its present line of 4 and 6-cylinder gasoline and diesel engines. The NXA of the new series has a 3-inch bore, 4-inch stroke and a displacement of 56.5 cubic inches and the NXB has a 3¼-inch bore, 4-inch stroke and a displacement of 66.3 cubic inches.

These two engines are identical in general design and the majority of parts are interchangeable, the only difference being in the bore size and the parts affected thereby. For continuous peak-load service both models can be operated up to 1,800 rpm, at which speed the NXA develops 12.4 and the NXB 14.7 corrected horsepower.

The Hercules system of cooling the valves through the stems is employed on these engines. Updraft manifolds of either the center or rear-outlet type can be furnished. The No. 5 SAE belt housing is furnished as standard equipment, although No. 4 can be furnished on request. Full force-feed lubrication to all main and connecting rod bearings is furnished and the lubricating pump, located in the oil sump, is driven through helical gears from the main camshaft. The crankcase is cast integral with the cylinder block and carries the crankshaft supported by two main bearings of ample proportion. The pistons are normally of cast iron, carrying three rings above the pin. The camshaft is supported in two main bearings of ample size, and is driven by helical gears.

These engines have L-head cylinders and the valves have 30-degree seats. The crankshaft is counterbalanced to compensate for the full amount of rotating mass, plus 45 per cent of the reciprocating mass, making for smooth 2-cylinder operation. Provision is made for the usual accessories, including generator, starter, flange-mounted magneto, battery-type distributor, mechanical governor, fuel pump, fan drive and 1-inch carburetor.

The first presentation of these engines was made at the Road Show in Cleveland where they were on display with many other models of the Hercules line.

New Sodium Luminaire

A new type of sodium luminaire, developed by the General Electric Co., Schenectady, N. Y., is being used by the California Division of Highways and the City of Los Angeles to light highway intersections and underpasses. The new unit burns a 10,000-lumen sodium lamp in a vertical position, the lamp being enclosed in a diffusing globe. The State of California is using this new luminaire, with a companion open-type sodium unit which burns a horizontally mounted lamp, at thirty-four danger zones.

The New G-E Sodium Luminaire

Bin and Batcher Catalog

Butler bins, batching plant and bulk cement plants set up on various types of jobs, as well as miscellaneous bulk cement handling equipment, are illustrated in an interesting catalog "There's a Butler Bin for Every Job."

Copies of this Bulletin F-40 may be secured by those interested direct from the manufacturer by mentioning this magazine.

Surface Vibrating Of Highway Concrete

In Indiana the practice of vibrating transverse joints has been considerably standardized. A vibrator head is fastened to an oak float with two runners, and is pulled slowly across the newly poured concrete, spanning the joint. Test cores show that this method gives vibration through to the bottom of the pour and eliminates air bubbles and honeycomb along the joints. This practice has been found quite essential for certain types of popular transverse joints.

By using this type of float the concrete vibrator can be readily detached and used in mass pouring, such as in culverts and bridges. The White vibrator shown in the illustration, made by the White Mfg. Co., Elkhart, Ind., is particularly adaptable to this method as well as for pulling along the longitudinal forms for vibration of the concrete adjacent to the side forms. In this latter case, a single runner is used.

Pulling a White Vibrator over a Transverse Joint in Ohio

The accompanying illustration was taken on the contract of R. L. Harris of Fort Wayne, Ind., on U. S. 30, east of Fort Wayne.

New Distributor for Welders in Tennessee

The Deaderick Machinery Co., of Knoxville, Tenn., has recently been appointed by the Harnischfeger Corp., of Milwaukee, Wis., as distributor for its line of P & H-Hansen Smootharc welders and welding electrodes in Eastern Tennessee.

The New Speeder Model LS-40

New 10-Ton Shovel Gas or Diesel Powered

One of the principal exhibits of the Speeder Machinery Corp., Cedar Rapids, Iowa, at the A. R. B. A. Road Show in Cleveland will be the Speeder Model LS-40 full-revolving shovel of 3/8-yard capacity. This light-weight high-speed machine weighs slightly less than 10 tons, and may be purchased with either a Waukesha 6 BK gasoline engine or a Caterpillar D-4400 4-cylinder diesel engine for power.

The light weight of this new shovel has been made possible by the extensive use of electric-welded rolled-steel sections and its high travel speed is made possible by the use of Caterpillar tractor-type tracks. The drive sprockets, track roller assemblies, track links and shoes are standard Caterpillar products. The LS-40 has four travel speeds from 0.9 to 3.1 miles per hour, either forward or reverse. The machine is fully convertible into shovel, dragline, trench hoe, crane and pile driver. A 4-wheel pneumatic-tired transport trailer with Timken bearings and internal expanding brakes is also available.

Speeder manufactures a complete line of crawler, truck and tractor-mounted excavators from 3/8 to 3/4-yard capacities together with a line of pneumatic-tired transport trailers, all sold through its exclusive dealers in all parts of the world. Complete information regarding the LS-40 and other Speeder excavators may be secured direct from the manufacturer by mentioning this magazine.

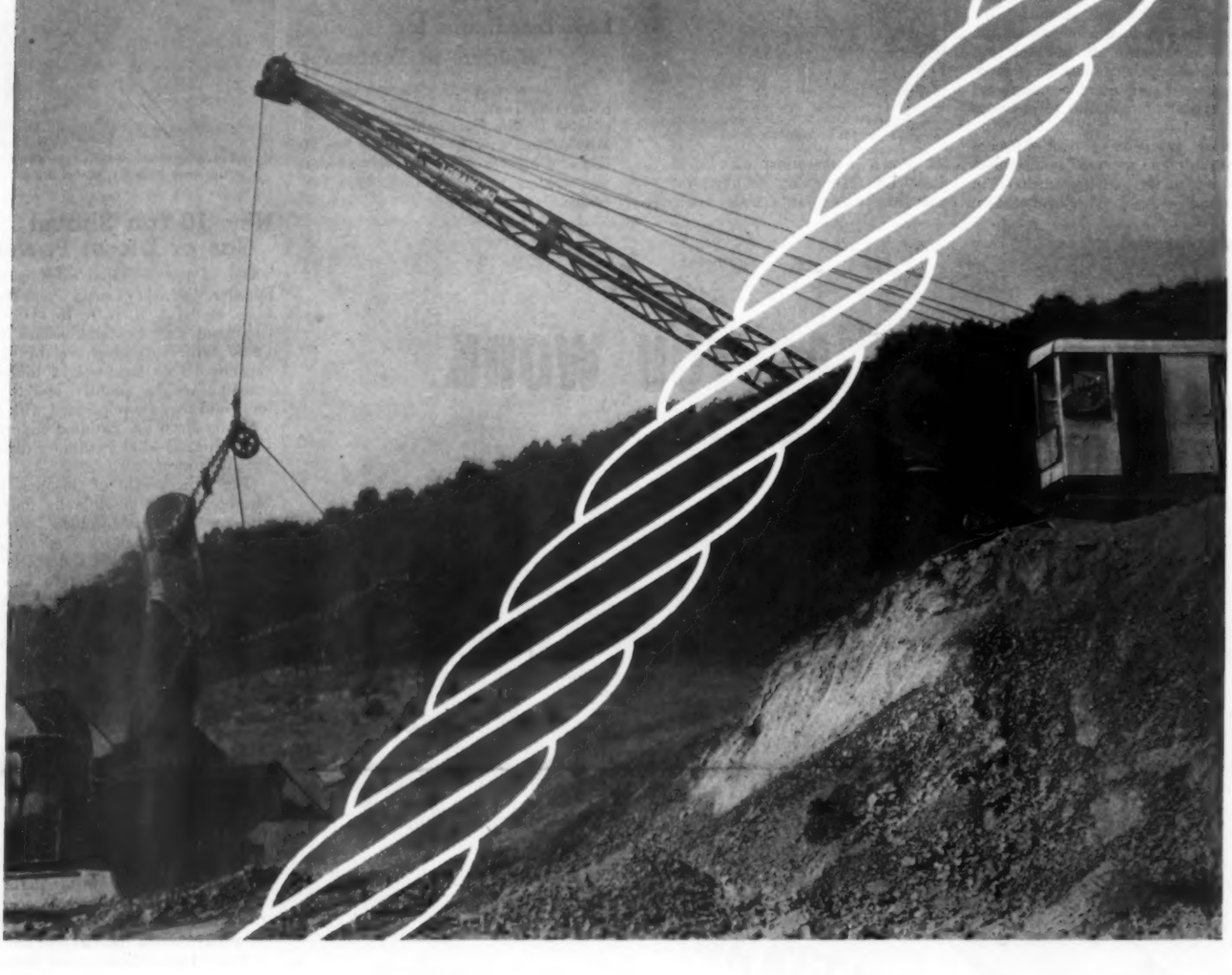
Improved 5-Yard Hydraulic Scraper

An improved Model 180 hydraulic scraper, features of which are light weight, great strength, clean dumping and even spreading, has been announced by the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill. Built of rust-resisting nickel-copper alloy steel of high-tensile strength, this unit can, by the addition of one valve to form a dual valve system, be made to operate both the scraper and a bulldozer or Grade-builder together or independently.

The scraper is operated from the tractor cab, using a four-way valve controlling twin cylinders for raising or lowering the scraper bowl. Power is derived from a rotary pump of the type used on Baker bulldozers directly connected to the engine transmission. Because of its light weight, this scraper can be loaded to capacity and hauled by a 40 to 50-hp tractor. The bowl is 6 inches wider at the rear than in the front to facilitate quick easy loading. To assist in digging into hard material, the entire weight of the scraper can be utilized in forcing down the cutting edge. To dump, the bowl is raised to vertical position, the end gate being automatically controlled to swing open sufficiently to dump the load cleanly and held low enough to spread evenly.

This Model 180 5-cubic yard unit is described and illustrated in Bulletin No. 596, copies of which may be secured direct from the manufacturer.

It's know how *that counts*



in Wire Rope

And there's plenty of "know how" back of Bethlehem Wire Rope—the accumulated experience of half a century of wire-rope manufacture by the Williamsport Wire Rope Company, recently acquired by Bethlehem. Take Drag Line on a boom machine, for example. Highest-strength steel is always specified. 6x19 lang lay construction is universally used. Yet, even with these two points standardized among all rope makers, Bethlehem Drag Line has won high favor among contractors.

"Know how" enables Bethlehem to build a perfected drag line—having definite features, unique in Bethlehem Ropes, which combat abrasive wear and resist the whipping action of casting. For one thing, the strands, whether Form-Set (preformed) or standard, are "back turned." As wire is twisted into strand, the individual wires themselves are given a slight twist, making them hug together. Likewise, as the strands are twisted into rope, the individual strands are twisted slightly, making a tight, solid surface to the line . . . a surface that has greater resistance to abrasion. This same "back turning" of the wires and strands balances internal stresses of the rope and makes it less kinky, less likely to bird-cage, easier to handle.

A small point, perhaps. Yet any contractor familiar with Bethlehem (formerly Williamsport) Rope can immediately tell the difference. Bethlehem Rope casts better. It won't twist when let loose. It wears longer.

Whether it's Purple-Strand Perfected Drag Line, Purple-Strand Form-Set Hoist Line, or wire rope for some other use, you'll find this "know how" invariably present in Bethlehem Lines.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

The Economic Side Of Roadside Work

North Carolina Settles On Roadside Development Practice and Makes It Pay Its Way

✦ NEW roadside improvement projects included in the 1938 Federal-Aid highway program in North Carolina will increase to approximately 170 miles the total mileage of North Carolina highways on which roadside improvement work has been performed or planned by the State Highway and Public Works Commission during the past four years. All work of this type now handled by the Commission is being financed half from Federal funds and half by State funds specifically allotted to match the Federal funds. The Bureau of Public Roads requires that one per cent of each year's Federal-Aid program be set aside and used solely for roadside improvement, so therefore this work does not draw upon funds available for regular highway construction.

Modern roadside improvement is more than roadside beautification, for, while planting for aesthetic effects may be part of the program, the program as a whole should, according to North Carolina's standards, not only improve the appearance of the highway but also must "pay its own way" by contributing to increased safety and more economical maintenance.

Sequence of Work

Before any ornamental plantings can become fully effective, certain types of foundation work are necessary. The proper sequence of work in North Carolina's roadside improvement program is as follows:

1. Conserve and protect the many existing woodlands and abundant natural scenery.

2. Elimination of unsightly features. A thorough and systematic clean-up of the highway right-of-way and adjacent private property in itself makes a surprising improvement in highway appearance. Logs, stones, tin cans, stumps, illegal advertising signs, auto graveyards, and other man-placed debris seriously detract from roadside beauty. At the present time, individuals and organizations interested in more attractive highways can make their most important contribution by concentrating on these two phases of the work. Since the Commission must necessarily limit its activities to the highway right-of-way, it is dependent upon civic groups and other interested individuals for the protection and clean-up of scenery outside the highway limits, which can make or mar the attractiveness of the roadside.

3. Flatten steep cut and fill slopes and smooth over rough and ragged areas of barren soil. This type of work blends the roadway grade into the surrounding ground surface and makes the highway seem a part of the landscape rather than a scar across the landscape. At the same time, this grading adds to highway safety.

4. Control soil erosion by seeding, sodding and planting vines as a ground cover. It is through this control of soil erosion that a contribution is made to the economical maintenance of highways.

5. Roadside planting in a way which will preserve the characteristic scenery of the state. In general, this can be done only by planting native species of plants in an informal manner. A rural roadside should not be a botanical garden; it should be a part of the existing landscape and therefore should have placed upon it those kinds of native plants that are found most abundantly outside of the highway right-of-way. If this principle is followed, the planting will become less and less conspicuous as a man-made improvement, and more natural and beautiful in appearance.

The first four phases of the work are the ones which form the foundation of roadside improvement and it is on these four items that the Commission is concentrating its efforts on Federal roadside-improvement projects.

Planting

Planting on Commission projects has been limited, due to three very definite reasons. The first is that the presence of many naturally beautiful woodlands provides a roadside that can not be improved upon by man and a small amount of clean-up and careful preservation of existing beauty is all that is required to bring about a fully effective result.

The second reason is that it has been observed on several of the first roadside improvements that a volunteer growth of trees and shrubs springs up in many places along the roadside even within a year after sloping and seeding work has been performed. Actual planting and plant maintenance for several years is costly so the Commission is taking advantage of nature's help and obtaining a roadside planting at no greater cost than that of selecting and protecting the volunteer growth.

The third reason for limited planting is that by concentrating first on flattening slopes and checking soil erosion, roadside improvement work can "pay

(*Continued on page* 36)

The Drill Barge Earthquake Line-Drilling Below Lock 3, at the Site of the Former Cofferdam

Barge Canal Branch Being Built in N. Y.

(*Continued from page* 9)

and does many miscellaneous chores in the short intervals when Mr. Griffin himself is not using it.

Practically all of this fleet came on the job at or soon after the start of work in the latter part of August, 1936. Work started in with a rush and by freeze-up the deepening and widening of the east half of Battle Island Cut had been completed, as well as much dredging in other sections. Freeze-up for Dunbar & Sullivan, incidentally, did not come until long after the November cold snap which finally closed the canal to traffic. The Empire, in fact, worked up to December 23, and the Earthquake more than a month later.

Winter Work

Ice in the canal, however, brought little relief for Mr. Griffin and his staff, for another phase of the work was then under way, the dry work below Lock 3. From the shore out to the concrete wall which separates the lock entrance from the river, a cofferdam was built, for which 7,000 cubic yards of clayey loam was hauled in by a local contractor. Then the area between the lock and cofferdam, roughly 1,000 feet long, was unwatered, and jackhammers, dynamite and a power shovel were put to work.

About 15,000 cubic yards of rock was to be removed here, averaging only about 3 feet deep. Jackhammer holes were drilled 3 feet below grade on 5-foot centers both ways. Blasting was done with 60 per cent strength L. F. N. G. dynamite in 1¼-inch x 8-inch cartridges. To protect the dock walls and the lock entrance wall, both sides of the excavation were line-drilled, putting holes down to 2 feet below grade on 1-foot centers. The contract, it may be noted, called for a total of 4,600 feet of line-drilling.

The broken material was loaded into trucks by dragline and power shovel and hauled up a ramp at the end of the excavation and away to the spoil disposal area.

Work in the cofferdam, started just before freeze-up, was completed well before the canal was open for traffic the following spring. As soon as conditions would permit, the drill barge and dredges once more dug into their work where interrupted by winter.

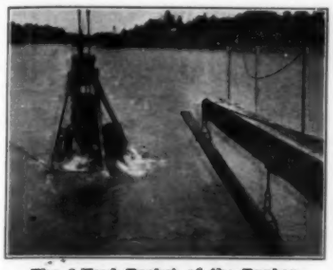
Submarine Rock Excavations

Based on rock soundings made in 1935, State Engineers made plans showing all rock projecting above the 14-foot plane. Following these maps and establishing position by means of an elaborate system of range markers along the shores of the river, the Earthquake is set over her work and the drills started. In rows 8 feet apart with the holes 6½ feet apart, drilling is continued to a depth of 4 feet below the 14-foot plane. In the old channel, most of the holes are 4 to 6 feet deep but where widening is necessary, the depth of the holes may be greater.

In the sandstone formation which makes up the great bulk of the rock excavation on this contract, the powerful steam drills make rapid progress. A modern high-speed turbine-driven centrifugal pump maintains a pressure of 200 pounds per square inch on the wash water which is fed to the hollow drill steel.

The explosives used in submarine work is 60 per cent strength L. F. N. G. dynamite in 2-inch x 8-inch cartridges, made up with special heavy wrapping to increase water resistance and mechanical strength. A rule-of-thumb loading ratio, which may be varied up or down, depending on conditions, is that 1¼ pound of powder is used for each foot of hole. This is equivalent, roughly, to 0.7 pound to a cubic yard of burden on the hole. It also works out under the average rock conditions encountered here at about 1.4 to 1.5

(*Continued on next page*)



The 6-Yard Bucket of the Dunbar

Under-Water Blasting Feature of Canal Job

(Continued from preceding page)

pound per pay yard because, obviously, when the holes are not deep a considerable proportion of the burden falls below the 15-foot plane which is the bottom limit of excavation paid for by the state.

When a hole has been drilled to the desired depth, the drill is hoisted and the explosive loaded at once. This is done by means of a loading tube such as is commonly used in this work. It comprises a hollow-walled tube of such internal diameter that the dynamite cartridges just fit snugly inside. They are placed in the tube from the bottom, and the primer cartridge with its No. 6 waterproof electric blasting cap placed last. Then the tube is worked down to the bottom of the hole, and the charge held in place by means of a long ramrod or plunger which passes down through the top of the loading tube. Particular care is taken to have every charge seated firmly at the bottom of the hole, because the delay entailed by failure to break to the desired level is far more serious than the time needed to get the charge to the bottom. The powerful water jet from the lower end of the loading tube, of course, is the only thing which makes it possible to obtain this result.

Fourteen-gage iron wire is used for lead wires, and the cap leg wires are cut off to 10 or 12 inches, or caps with leg wires of this length are obtained from the manufacturer. This is done so that when the lead wires are connected to the leg wires, and a firm hitch made around the primer cartridge, the heavier iron wire will take all the strain that may come on the wire while loading and preparing to blast. The lead wires fit into a deep slot in the lower end of the loading tube and help to hold the primer cartridge up in place.

When all holes in a row, usually 16 or 17, have been drilled and loaded, the Earthquake is backed off a safe distance, and the shots are fired individually by means of a blasting machine or from the drill boat's electric power circuit. Sometimes a number of adjacent holes propagate from one. Several men each hold the lead wires from a group of holes in their hands, maintaining sufficient tension so that when the shot is fired they can tell by the wires going slack what holes have shot.

Careful logs and map records are kept of the drilling for the guidance of the dredging work which is to follow. This is only one of the duties which occupy P. D. Miller, Jr., Chief Engineer, and his assistants. They establish range markers for the guidance of drill barges and dredges and provide the necessary maps and data for dredging as well as drilling operations. They keep the records of yardages moved, spot and measure all well-drill holes and carry on various and sundry surveying and other engineering services. During the winter, a season which is often one of office work for dredge men in the northern states, the engineers, at Mr. Griffin's suggestion, worked out the equations of the network of range lines and devised a system, based on analytical geometry, which considerably decreases the amount of office computation needed to carry on the subsequent surveying work.

Dredging, following the drill barge, is conducted on as systematic a basis as the irregular occurrence of the patches of rock will allow. The Empire works steadily from one end of her course to the other, taking up an 18-foot wide strip of broken rock at each passage. As each scow is loaded it is taken in charge by one of the tugs and taken to a spoil area and dumped. The largest such area available on this stretch is the one between Battle Island and New Island. Other spoil areas are along the river above and below this point and, in several places, include the old canal which is a branch of the original Erie Canal and preceded the Barge Canal. In such places it occasionally happens that the draglines can excavate and dump direct to the spoil area. They likewise are needed to rehandle the rock dumped by the scows in the Battle Island

(Continued on page 41)

Earth Dam by WPA For Large Reservoir

Storage Basin Near City A Part of Birmingham's New Industrial Water Supply Project

(*Photos on page 44*)

✦ THE NEW impounding reservoir near Inland, Ala., the 39-mile steel pipe line to the city, 5 miles of cast iron pipe line and the 65,000,000-gallon distribution reservoir near Pawnee, Ala., comprise the major elements of the great $6,000,000 industrial water supply project which Birmingham, Ala., is creating with PWA and WPA funds to make possible an expansion of the industrial activity in the city. The dam for the impounding reservoir has already been described (C&EM Feb. 1938, page 2) with an outline of the entire project. This article will be devoted to the construction of the earth dam for the reservoir near the city.

The distribution and pressure-stabilizing reservoir covers 31 acres and involved the construction of an earth dam 75 feet high and 1,850 feet long, the stripping of all growth and top soil from the basin, the construction of a standpipe with a concrete spillway, the building of concrete conduits to shield the 60-inch main through the dam, the riprapping of the inside slope of the dam, and the building of a plant for the control of the chemical character of the water.

The standpipe will care for the surge of water in the pipe caused by rapid fluctuations in demand and will be 48 feet high and 42 inches in diameter. It is open at the top to permit water to flow out the top when the heavier surges occur, the water overflowing onto the concrete spillway and thence into the distribution reservoir.

Work on the Dam

The dam has a 10-foot crest and 3 to 1 upstream or wet slope and a 2 to 1 outside slope. The dam when completed will contain 192,000 cubic yards of selected compacted material with a moisture content of around 11 to 15 per cent. This is somewhat drier than many earth dams now under construction but it is considered satisfactory for the type of clay that was used here and it certainly has compacted to a remarkable solidity under the repeated tamping by the sheepsfoot rollers.

The original borrow pit was opposite the dam in the hillside but the acceptable clay ran out and a new pit was opened within the reservoir site. Later still it was necessary to go outside the reservoir entirely to secure satisfactory material. The average haul from the reservoir site to the dam was about 1,200 feet but the outside borrow pit required a haul of 2,000 feet.

The equipment used for the preparation of the earth dam included three 12-yard LeTourneau Carryall scrapers with two D8 tractors and a Seventy-Five diesel, a LeTourneau bulldozer on a Caterpillar diesel Fifty, and three LeTourneau sheepsfoot rollers pulled by Caterpillar Forties. The banks of the reservoir were trimmed with a Caterpillar 10-foot blade prior to the final trim by hand inside for the placing of the riprap.

The clay material for the dam was laid down in 6 to 9-inch layers, wet as needed but not to sloppy stickiness, and compacted with the sheepsfoot rollers. The Carryall scrapers hauled in as much as 2,500 cubic yards in the three 8-hour shifts but on the longer hauls that were necessary later in the work 1,600 cubic yards was the average. The sprinkling

(*Continued on page 35*)

C. & E. M. Photo

Hand-Laid Riprap Was Placed the Full Width of the Inner Slope of the Dam

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law

When Claims for Defective Work Are Outlawed

"You owe us more than $6,000 damages for failing properly to lay floors in those public buildings," complained a general contracting company to a sub. "The State relaid the floors and got judgment against us for $3,042.55, and we spent more than that amount trying to prevent judgment being taken against us."

"We deny that we failed to live up to the requirements of our contract," replied the sub. "But, assuming for the sake of argument, that the job was defective and you once had a good claim for damages against us, you have delayed too long in asserting it. We completed the job in 1922 and here it is 1929, before you make claim against us. The laws of this state give but six years in which to sue on a claim of this kind."

Lawyers called in to help settle the matter did not agree on the question, and the controversy came before the United States Circuit Court of Appeals, Third Circuit, for decision. In an opinion filed August 18, 1931, that court said that the sub was right in its contention —that, under the laws of Maine, suit had to be brought within six years to be maintainable, and that the six-year period ran from the date when the subcontract was completed, and not from either of the later dates when the floors cracked or when the State, as owner, got judgment against the general contractor. In other words, if the sub broke its contract the breach must have occurred before it turned the work over to the general contractor. (51 Fed. 2d, 906.)

Law and Arithmetic

"Your Honors," declared an attorney to seven begowned judges sitting behind one of those judicial benches that resemble a bar, "there is no basis on which the court can determine how many cubic yards of dike were thrown up by the plaintiff subcontractor for the defendant general contractor. Therefore, the plaintiff has failed to establish a right to recover compensation, because it was to be paid 12 cents per cubic yard."

"But," replied the Minnesota Supreme Court, "you overlook the fact that the evidence shows the center heights of the dike at stations 100 feet apart, that the dike was sloped like an inverted V, and that the base was one and one-half times as wide as the dike was high. Hence, the center height of the fill at each station, properly recorded in the field notes, indicates also the base, and the two, with the length of the prism, are the only measurements necessary from which to reckon its cubic contents. Judgment for the subcontractor was properly awarded by the trial court on those figures. Next case." (Bernard-Curtiss Co. v. Minneapolis Dredging Co., 274 N. W. 229.)

A Costly Cigarette

No one would be so bold as to try to hold a contractor liable for an employee's breach of promise to marry a girl, because that is something beyond the employment relationship. Nor would any one suppose that the contractor would be liable if the employee should burn up the countryside by carelessly dropping a lighted cigarette in dry grass, while on a pleasure outing off duty. But a decision rendered by the Arkansas Supreme Court shows that the boss has some vital interest in what his men do personally while on the job. (Vincennes Steel Corp. v. Gibson, 106 S. W. 2d, 173.)

In this case, it appeared that while an employee of a bridge contractor was on nearby land gathering rock, in the course of his employment, he dropped a lighted cigarette under such conditions as to cause a fire that was not stopped until it had spread over several tracts of land. When sued for the resulting damage, the contractor vainly sought to avoid liability on the ground that smoking was a personal act, and not something connected with the employment relation. The Court of Appeals ruled that had the boss gone to gather the rock himself, he would have been liable had he dropped a lighted cigarette and caused the fire, and that he must respond for similar carelessness of the employee sent to do the work.

Wins Fire Policy Suit

"Hello, Insurance Agency," telephoned an Albany contractor. "I am building a house on Lot So-and-so. Please issue a $4,000 fire policy to cover."

A policy was issued but the contractor did not take the time to make sure that it was properly worded until a fire had done more than $4,000 damage to the structure. Then he discovered that there were erroneous recitals in the policy as to ownership, to whom loss was payable, etc. And the insurance company was not slow to treat these recitals as a loop hole for refusing to settle with the contractor.

The contractor sued to have the policy corrected to read the way it should and won out before the Appellate Division of the New York Supreme Court, in the case of Cardinal v. John Roshirt, Inc., et al., 273 N. Y. Supp. 487. Here are the high spots of the court's decision:

"The plaintiff had an insurable interest in the property. * * * His interest in the property was that of contractor. He was not seeking to protect the interests of the owner or any mortgagee. * * *

"The defendant undertook to furnish the plaintiff the insurance which he requested. That was the only kind of insurance which he had applied for, and therefore the only kind which under his application he was obligated to receive unless he thereafter waived the terms of his application and consented to receive a different policy."

Moral: Unread insurance policies are of doubtful value.

Work Well Handled On Miss. R. Lock 24

(*Continued from page 17*)

sleeves used for spreaders and tied with square plates and nuts. All forms were guyed in all directions with steel cable, in accordance with the specifications.

As the erection of forms and the concreting, even in different places, was done on different shifts the cranes were used on one shift for handling the forms and on the next shift for swinging the concrete buckets. The crane equipment consisted of the Bucyrus-Erie 50B steam crane mentioned before, a Koehring 401 with 60-foot boom, a Koehring 502 with 60-foot boom, and a Clyde-Wiley running on a 13-foot gage track and equipped with a 100-foot boom. A Lorain 40 shovel with a ⅜-yard bucket aided rock moving.

The Central Concrete Plant

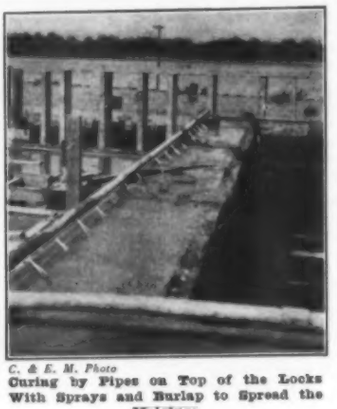
With the day shift handling the form work, the attention of the night shift was given to the pouring of the concrete. All the aggregate was hauled in by the C. B. & Q. and the cement came in by water. Hopper-bottom cars were loaded by the Missouri Sand & Gravel Co., at LaGrange, Mo., and hauled 75 miles to the job. They were dumped into four separate pits, one for each of the two grades of sand and the two sizes of gravel. A Koehring 301 crane with a 45-foot boom unloaded the aggregates from the pits to the batcher bins or to sidehill storage, using a 1-yard Blaw-Knox clamshell. As required, the aggregate cars were moved along the siding by a Sullivan electric car puller with a Westinghouse motor.

Cement in bulk was supplied by the Universal Atlas Portland Cement Co. from its Hannibal, Mo., plant and delivered by barge, the towing being done by the Blaske Boat & Barge Co. of Alton, Ill. The barges were delivered on the outer side of the cofferdam and unloaded by a Fuller-Kinyon pneumatic system through a 4-inch aerial line across the cofferdam to the shore and into a 180-barrel Blaw-Knox cement silo and thence by a worm conveyor to the batchers.

The weighing batchers were furnished complete by the Blaw-Knox Co. and had automatic control for weighing, hand dumping and a push-button starter for batching. The water and cement were weighed separately while the four aggregates were weighed into the same hopper and the weight shown on one dial. The batches were dumped by an air ram of the contractor's own design and a flap gate below delivered the batches to one or the other of the two 1-yard Rex mixers in which the materials were mixed for 1½ minutes. One man handled the batching and dumping of the batches. One mixer man dumped mixed concrete into the receiving hopper of 3-yard capacity and another man filled the Blaw-Knox roller-gate buckets. Beneath the receiving hopper where the trucks backed in with the buckets a heavy 12 x 12 timber was used as a buffer so that the trucks would stop with the buckets in position below the hopper. To protect both the trucks and the timber, it was sheathed with some old heavy pneumatic-tire shoes for resiliency.

Moving and Curing Concrete

It was not difficult to maintain a good road on the shale floor of the lock for the five flat-bed International trucks which hauled one 2-yard Blaw-Knox roller-gate bucket each. There was one road each side of the main lock and a single road up the middle of the auxiliary lock. Concrete was poured up to January 15, 1937, and then work was shut down until the last of March, 1937.



C. & E. M. Photo

Curing by Pipes on Top of the Locks With Sprays and Burlap to Spread the Moisture

The work up to that time had been confined to the guide wall. The concrete buckets were swung up over the top of the forms and dumped into 5-foot diameter hoppers at the top with elephant trunk spouts down into the forms. Two or three men at the top handled the concrete from the buckets to the hopper and controlled its flow down the spouts. In the forms, seven or eight men did the puddling, some by rodding and others with electric-driven Vibrospades.

The maximum height of the lock walls is 40 feet for the intermediate and land wall, while the river wall is 59 feet high. These were poured in lifts varying from 9 to 18 feet high. The contract called for better than 80,000 cubic yards of concrete. The best pour was 500 cubic yards in 8 hours while the average pouring speed throughout the job was 55 yards an hour.

The forms were left in place for 48 hours, stripped by the cranes and then the face of the concrete kept wet for 14 days. This was done by placing burlap over the top sections of all exposed concrete and then stringing ¾-inch pipe along the top with holes spaced 6 inches apart to spray water over the burlap and then permit it to run over the face of the concrete.

Compressed Air Plant

A single Type 40 Ingersoll-Rand air compressor with a 75-hp Century motor in a house on the shore at about the mid-point of the cofferdam furnished all the air used by the general contractor for air pumps, cleaning, and the jackhammers used for drilling for the placing of dowels.

(*Continued on next page*)

Thought for Men Speeds Lock Job

(Continued from preceding page)

Grouting Under Walls

As a precaution against the seepage of water under the lock walls, the contractor was required to grout 20 feet deep in 1½-inch pipe wherever tests with air showed any leakage. A Union grouter was used for the placing of the grout where needed.

Labor and Shifts

Before a word is said about the labor organization it should be mentioned that the job was provided with an unusual amount of safety features in the way of well-built ladders, clear walkways, and signs at every turn to caution the worker to use the utmost care in the protection of himself and fellow workers. The general contractor used a maximum of 450 employees on the job at one time, and during the greater part of the time the pay-roll averaged 400.

There were two shifts of carpenters on forms and two shifts on concreting. The carpenters worked from 4 A.M. to 12:30 P.M. with a half hour out for lunch at 8 A.M. and the second shift worked from 12:30 to 9 P.M., making two 8-hour shifts. The concrete crews worked from 4 P.M. to midnight, and midnight to 8 A.M., "eating on the run". As mentioned before, this permitted the cranes to be used for handling forms during the day-light hours and for concrete during the dark hours.

Personnel

The contract for the construction of Lock 24 on the Mississippi River at Clarksville, Mo., was awarded to the Central Engineering Co. of Davenport, Iowa, on its low bid of $1,632,289.45. Art Cossens was Construction Superintendent for Central. The subcontractor on the steel work, including the lock gates and the Taintor gate for the control of the flow of water to the lock, was the American Bridge Co. The work was done under the direction of the St. Louis District Office of the U. S. Engineer Department.

Single and Double V-8 Trailer Compressors

The new light-weight models of W-K double-cooled air compressors have been announced by the W-K Mfg. Co., 2136 Jefferson Ave., Kansas City, Mo. These compressors are of 70 and 140 cubic feet actual air delivery, and both sizes are available on skids or pneumatic-tire spring mountings. Two Ford V-8 engines are utilized in the manufacture of the 140-cubic foot machine while one V-8 is used in making the Utility 70-foot model illustrated. One bank of the V-8 engine is used for power cylinders and the other bank is utilized for air cylinders.

These compressors are designed particularly for portability and may be towed behind an automobile at speeds up to 60 miles per hour. A special snap-on towing hitch makes it possible to attach the compressor to an automobile or truck for towing in one minute. The manufacturer claims economy in operation, points out that parts are available at all Ford dealers and that the machine is equipped with double-cooled air valves, electric starter, 6-volt plug-in lights, and a vertical hose reel tank.

One of the New W-K Trailer Compressors

Dealer and Mfr. Combine

The Day Pulverizer Co. and the Brooks-Payne-Osborne Equipment Co., distributor of Bucyrus-Erie and other construction equipment, both of Knoxville, Tenn., have consolidated to form the Brooks Equipment & Mfg. Co. This firm has its offices, factory and warehouses at 408-410 Davenport Road, Knoxville.

Surface Consolidation And Dustless Maintenance

"Surface Consolidation and Dustless Maintenance of Traffic-Bound Roads" is the title of Bulletin No. 33 recently issued by the Calcium Chloride Assn., Penobscot Bldg., Detroit, Mich., covering in some detail the subject of road improvement methods.

Well-illustrated and presenting data on a practical solution of the loose gravel problem, this booklet may be secured by interested contractors and state and county highway engineers direct from the Association.

Hydraulic Dredge With High Output

The G. A. McWilliams Used on Item B of the Dauterive-Fish Island Levee in 1937 Season

(*Photo on page 44*)

✦ ANOTHER of the big hydraulic dredges employed on the construction of the Atchafalaya Floodway levees during the 1937 construction season was the G. A. McWilliams of the McWilliams Dredging Co., New Orleans, La. Its contract required the handling of 1,600,000 cubic yards of material, 40 per cent of which was sand and 60 per cent of which was clay. The McWilliams moved a monthly average of 180,500 cubic yards net placed in the levee and a gross of 509,000 yards from the pit. The contract for Item B of the Dauterive-Fish Island Levee was awarded to the McWilliams Dredging Co. on its unit bid of 35.90 cents, totaling $574,400 for the work.

The steel hull of the dredge is 140 feet long, 35 feet wide and 9 feet deep with a normal draft of 7 feet under working conditions. The spuds are 28¼ inches square and 70 feet long. The steel ladder is 70 feet long, carrying the 9-inch cutter shaft driven by a 350-hp electric motor. The cutter is operated at 30 rpm. The suction pipe connection to the hull is 13½-foot Thermoid rubber coupling.

The dredging pump is a Kling Bros. 2-fluke pump with a 27-inch suction and originally a 24-inch discharge but in July this was cut to a 20-inch discharge. The pump impeller is 66 inches in diameter and runs at 290 rpm. The main engine is a Nelseco solid-injection single-action engine developing 1,200 brake-horsepower at 300 rpm.

The auxiliary drives or engines are a Nelseco 550-bhp solid-injection single-acting oil-engine running at 250 rpm, a Worthington 100-bhp diesel running at 500 rpm and a 6-hp Lister running at 600 rpm on the air compressor. A 375-kw lighting plant on the dredge and a 5-kw 110-volt dc plant on the quarter boat furnish current for all lighting purposes. The attendant plant includes the 200 x 50-foot quarter boat for the 108 men required for the four 6-hour shifts although the dredge was operated on three 8-hour shifts for this work, requiring 28 men per shift. There were five launches and four dredge tenders, a steel water barge and a steel oil barge.

The pontoon pipe line consisted of 32 units and an elbow each 50 feet long. The pontoons are 3½ feet in diameter and 20 feet long. The pontoon connections are Thermoid rubber couplings. The shore pipe consists of 20,000 feet of 16-foot lengths with interlocking chain connections.

Personnel

This work was under the direction of the Second New Orleans District, U. S. Engineer Department, Lieut. Col. William F. Tompkins, District Engineer, and Capt. Chester K. Harding, Area Engineer.

Fifty Years of Service In Inspection and Tests

In 1938 the Robert W. Hunt Co., 175 W. Jackson Blvd., Chicago, Ill., is celebrating the fiftieth anniversary of its organization as a testing and inspection service. During this half century its history has been one of constant expansion to keep pace with the desires and needs of its clients. From less than half a dozen pioneers it has grown to an international organization of several hundred chemists, metallurgists, engineers and inspectors, which maintains its own offices, permanent inspection units and laboratories conveniently located in relation to the principal industrial centers of the United States, Canada, England and continental Europe. Agents are retained in other parts of the world.

The present officers of Robert W. Hunt Co. are: J. C. Ogden, President; F. M. Randlett, Vice President and General Manager; D. W. McNaugher, Vice President and Treasurer; and W. A. Gresens, Secretary and Assistant Treasurer.

Roads Kept Open

This is the title of a 32-page booklet describing LaPlant-Choate hydraulically-operated snow plows for mounting on Caterpillar tractors for use by state and county highway departments to keep roads open during the winter months. In addition to a complete description of these plows, the booklet contains a large number of interesting photographs showing these snow-plowing units on state and county roads

Copies of this booklet may be secured by those interested direct from the La-Plant-Choate Mfg. Co., Cedar Rapids, Iowa, by mentioning this magazine.

The New Syntron High-Speed Vibrator

New Electric Vibrator

A new electric-motor-driven high-speed internal-type vibrator for vibrating concrete into place as it is poured has just been announced by the Syntron Co., 640 Lexington Ave., Homer City, Penna. The unit consists of three pieces, an electric-drive motor mounted on two small wheels, a variable length of flexible shafting, and the vibrating tool which is immersed in the concrete.

The electric motor is of the repulsion-induction type and operates on both 110 and 220 volts, single-phase alternating current. It has a built-in gear box with quiet molded gears that increase the driving speed to 7,200 rpm. The flexible shafts are metal armored and are available in 7 and 12-foot lengths which can be coupled together to make up a maximum length of 31 feet. The vibrating tool is available in two sizes, 1⅝ and 2⅝ inches in diameter and consists of a steel cylinder, inside of which is an out-of-balance shaft rotating at high speed in heavy ball bearings, which sets up a vibration permeating the mass in all directions.

A catalog containing detailed information on this new vibrator and its uses may be secured direct from the manufacturer by mentioning this magazine.

Pusher Tractor Loads Large Scraper Units

In order to break the bottle neck between the San Francisco Bay region and the San Joaquin Valley the State of California has been widening the Altamont Pass on U. S. Highway No. 50 to permit the construction of a four-lane divided highway. To further increase the production of the U-20 Carryall scrapers used on this job, Granfield, Farrar and Carlin, contractors of San Francisco, California, are using a Pushdozer as a booster to increase the speed of the scraper during loading when its function of cutting the earth naturally slows up forward progress. The Pushdozer is a unit designed for tractor mounting much the same as a bulldozer but instead of the customary blade there is a buffer which is used to push at the rear of the scraper during loading.

As a basis for figuring the actual economy in the use of this new device, a 222-minute time study was made of the output of the scraper using the Pushdozer followed by another 265-minute time study when the Pushdozer was not used.

Under normal operation without any booster the scraper handled 79 yards of dirt per operating hour on an average round trip haul of 1,700 feet. There was a total of 29 trips averaging 9.14 minutes per trip. The Carryall scraper hauled an estimated load of 12 pay yards per trip and required three minutes and 300 feet to load. The earth swell was about 33 per cent.

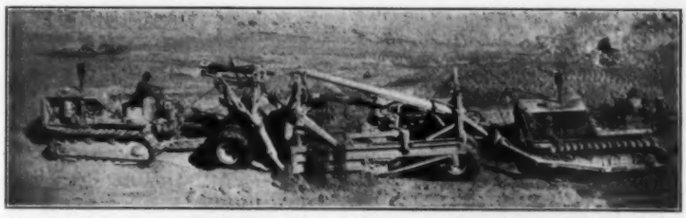
With the Pushdozer the Carryall was able to handle 121 pay yards per operating hour on the same haul of 1,700 feet round-trip and 29 trips total. The average time per trip, however, was reduced to 7.66 minutes and the measured load size was increased to 15.4 pay yards, while the average loading time was reduced to 0.97 minutes and the loading distance reduced to 128 feet. This indicates an increase of 53 per cent in the yardage production when the Pushdozer was used. The Pushdozer unit cost was spread over the production of four U-20 Carryalls. The increased production resulted in a saving of 1.08 cents per cubic yard after the cost of Pushdozer operation had been added. The material in which the unit was working was adobe and serpentine.

The total job yardage on this contract amounted to 1,375,000 cubic yards with 26,000,000 station-yards over-haul. The bid price was 24 cents per cubic yard for excavation.

New Crusher Bulletin

The Universal Crusher Co., Cedar Rapids, Iowa, has just issued Bulletin 4-A on its new 1938 Model No. 1016 roller-bearing jaw crusher, a feature of which is the double-action pitman motivated by the overhead eccentric which was originated by Universal.

Other design features and specifications are given in this bulletin, copies of which may be secured direct from the manufacturer.



The Loading of a Large Scraper Was Speeded Up by a Tractor and Pusher Device On the Altamont Pass Job in California

New Smootharc Manager

Abbott F. Riehle, formerly in charge of sales and management of the Riehle Brothers Testing Machine Co. of Philadelphia, Pa., has been appointed Sales Manager of the Smootharc Welder and Welding Electrode Division of the Harnischfeger Corp. of Milwaukee.

Three Heavier Wrenches Added to Williams Line

Three new double-head double-offset 12-point box Superrenches have been added to the line of wrenches made by J. H. Williams & Co., 75 Spring St., New York City. These wrenches, designed for heavy service, range in length from 23 to 27 inches with openings from 1 7/16 to 2⅜ inches.

These new Superrenches are forged from chrome-molybdenum steel, heat-treated and finished in chrome plate. They are unusually strong and are designed to permit work in very close quarters. Complete details may be found in Circular No. A-349, copies of which may be secured direct from the manufacturer.

New Thread-Forging Device For Rethreading Jackbits

The new thread-forging device for rethreading Jackbit steels, consisting of a set of blocks and a die used with the I-R sharpener, has been tried out on the contract for the new Storm King bypass between West Point and Cornwall, N. Y. The contractor for this job, the West Shore Concrete Co., of Suffern, N. Y., has about 600,000 yards of unclassified excavation, 75 per cent of which is rock.

With the new I-R thread-forging device, the contractor estimates that about 20 rods an hour can be rethreaded by this new process, which not only rethreads the steel but produces a tougher thread more resistant to drilling shock.

Complete information on this new device may be secured by those interested direct from the Ingersoll-Rand Co., 11 Broadway, New York City.

Advertising Director Of U. S. Steel Corp.

The U. S. Steel Corp. has announced the appointment of Charles R. Moffatt as Director of Advertising. Mr. Moffatt has been Advertising Manager of Carnegie-Illinois Steel Corp. since the organization of that company in 1935, and director of exhibits of U. S. Steel Corp. since July 1935. The new office of Director of Advertising, combining advertising and exhibit activities, will be located at 436 Seventh Ave., Pittsburgh, Pa.

Earth Dam Built For Alabama City

(*Continued from page 28*)

was done by three Dodge trucks with 500-gallon tanks and a perforated pipe on the tailboard. The only soaking that was necessary was the top crust which was baked solid by the sun and had to be softened so that the next layer of material would become well incorporated with it. In general the clay as taken from the pits had about the proper moisture content for acceptable working.

At the start of the work on the earth dam the WPA rented all the equipment with the drivers but when the funds had been practically used up, the city rented the machines and the WPA hired the labor.

The riprap on the wet slope is one-man stone laid up 18 inches thick for the full height of the dam, about 76 feet. The riprap was secured from a small quarry opened as a part of the project about a mile distant from the reservoir site. Here most of the man-hours of work was absorbed in getting out the stone. Fifteen men worked continuously in the quarry during daylight hours. An Ingersoll-Rand V-type compressor with 2-stage compression was used to operate two I-R jackhammers working in the hard sandstone. A small amount of blockholing was necessary to reduce the rock to one-man stone.

For loading at the quarry, logs were set up behind tree stumps to form the ramps in front of which the trucks backed up, permitting the easy loading of the trucks by hand. Three trucks were used for hauling the riprap and from 10 to 25 men were used for laying it in the reservoir.

The spotter of the Carryalls picked out all the roots from the clay as spread and there were no stones in the borrow pits at any time. When work was started, the scrapers with WPA labor were used to strip the entire reservoir site of top soil and then the pits were similarly cleared. The dam was built with no cut-off trench nor with a center core. The Resident Engineer permitted rain water to be impounded behind the dam so that the sprinkling trucks could use it instead of going some distance from the dam for the water.

The job was pushed 24 hours a day for 6 and 7 days a week to insure its completion within the time limit so that it would be ready for service when the dam at Inland was completed. Four wooden towers were used to support the wires for the strings of 100-watt lights to give ample light for the night work. Ten Carbic lights were spotted as needed around the work, making the job almost as light by night as by day. Five 500-watt floodlights on poles were spotted on the edge of the dam to permit lighting the entire dam area during the night shift.

There will be an automatic valve on the pipe line to control the flow of water into and from the reservoir in addition to the surge pipe. When there are sudden demands for water in the city the reservoir will take up the capacity requirement and the level of the water will drop. As soon as the demand ceases the water will flow into the reservoir from the pipe line up to a predetermined elevation.

The outside slope of the dam is to be sodded with sprigs of Bermuda grass.

Personnel

The Distribution Reservoir was constructed under the direction of the Engineering Commission of the Birmingham Industrial Water Supply Project, J. D. Webb, City Engineer, Chairman, O. G. Thurlow and A. Clinton Decker, with A. C. Polk as Executive Engineer. Lucian W. Draper was Resident Engineer on the Distribution Reservoir.

New Small Scraper

A new Carryall scraper, smaller in size and designed to meet the requirements of contractors, state and county highway engineers on smaller dirt-moving jobs, was announced at the Road Show in Cleveland by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif. This new G-6 Carryall has the rugged construction and features of design of the larger Carryall scrapers and is built for use with a Caterpillar D6 tractor.

It has a double-cable action, one cable operating the high apron lift and the other operating the bowl, which is self-cleaning and will spread in accurate layers of from 1 to 15 inches.

Complete information on this new G-6 6-cubic yard Carryall may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Roadside Work Pays Way in Carolina

(*Continued from page 25*)

its own way" through decreased maintenance costs, particularly in the item of ditch cleaning. The matter of justifying roadside improvement work in terms of dollars and cents is important, for, in the final analysis, a modern major highway unless constructed solely as a scenic highway is a business proposition.

After a solid foundation of well graded roadside has been laid, and after nature has been given several years to restore the borders of the highway with a natural volunteer growth, it will be a simple matter to add a few well-chosen plants to accent and supplement nature's efforts.

Federal roadside-improvement projects are really only demonstrations of what can be done, and are experimental areas for studying technical details of construction and maintenance. To improve an extensive mileage of highways in a complete fashion within a few years is an impossibility from the standpoints of both finances and administration. But there need be no delay in taking action to accomplish the first two steps of the program, the conservation of existing beauty and the elimination of unsightly features, along many miles of roadsides. If this foundation work is not done now, any later attempt at a complete seeding and planting program will be ever so much more difficult and costly.

Outside Help

The Commission urges that civic groups and individuals planning to sponsor and finance roadside improvement work in their communities do not consider planting along roadsides except at locations where the foundation work is not necessary, or where it can be undertaken by the sponsors as part of their local project.

Editor's Note: North Carolina's regulations for roadside planting will be described in our next issue.

The Skid Proofing Of Icy Pavements

A new bulletin summarizing the recommendations of the Highway Research Board relating to the use of calcium chloride with grits for ice treatment, and giving typical reports of winter maintenance practice covering the organization, operation and methods in county and state programs, has been issued by the Calcium Chloride Association, 4145 Penobscot Bldg., Detroit, Mich. Copies of this bulletin, No. 36, are available free on request to readers of this magazine. City street and special ice control problems are also discussed, as well as the special properties, advantages and economics of calcium chloride use for ice control.

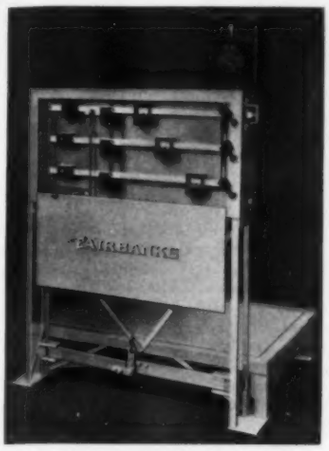
New Self-Priming Pump With No Recirculation

During the past year, the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., has brought out a completely new series of Rex Speed Pumps. Recirculation of water while pumping is impossible in these new pumps because of their construction, and their prime control is entirely automatic. These pumps are built lighter than the earlier models and hence are easier to move. The new design results in faster priming and they keep their prime longer, using less horsepower to do it. They are equipped with a larger more compact recirculation tank.

The sizes of these pumps range from 7,000 gallons to 125,000 gallons per hour with enough intermediate sizes so that the contractor may select a pump to meet any requirement.

Smith of Littleford Killed

Marion A. Smith, Advertising Manager of Littleford Bros., Cincinnati, Ohio, was killed in a grade crossing accident last month. Mr. Smith, who was only 30 years old, was associated with Littleford Bros. for a number of years.



A New Wheelbarrow Scale

Wheelbarrow or Cart Scales for Aggregate

The increasing use of wheelbarrow and cart scales on small bridge and culvert jobs where the amount of concrete used does not warrant a standard batching plant has been noticeable throughout the country. These scales enable a contractor to meet rigid specifications on all small jobs. Fairbanks aggregate weighing scales made by Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill., are designed with three beams when used for weighing sand and stone. Two beams are used for weighing the two aggregates and a tare beam for setting off the tare weight of wheelbarrows or carts. Where three aggregates are used, the 4-beam type consisting of three aggregate beams with a tare beam for setting off tare weight is desirable.

Each beam is directly connected to the precision indicator which has an over-and-under indication to show the exact state of balance when the beams are locked up in the dust-free case. The precision indicator is of the pendulum type without springs. It has an enclosed mercury tube control for damping, thus eliminating the dash pot. If desired, the indicator can be furnished with a bell-ringing device as an extra indication when a correct load is on the scale.

The scale standard and platform are of welded steel construction. The platform is only 9 inches high so that it is easy to push a wheelbarrow or cart up the incline. The platform can easily be lifted off when it is necessary to clean the scale parts.

Snow Drift Control By Tree Planting

The second in a series of investigations on snow control conducted jointly by the Engineering Experiment Station of Michigan State College, of which Dean H. B. Dirks is the Director, and the Department of Civil Engineering, headed by Professor C. L. Allen, has recently been published. This bulletin "Snow Control by Tree Planting," written by E. A. Finney, Assistant Professor of Civil Engineering, is the result of that part of a research project on snow drift control started in 1926 devoted to the study of drift control by tree planting.

The subjects covered include a comparative study of conifers, tree characteristics, a study of deciduous trees and their characteristics, transplanting, maintenance and protection of trees and shrubs, methods of tree planting for snow control, factors to be considered in tree planting for snow control, wind tunnel experiments on tree plantings, shrub planting for snow control, shrub characteristics, a summary and conclusions, and a bibliography.

Copies of this Bulletin No. 75 may be secured from the Engineering Experiment Station, Michigan State College, Box 470, East Lansing, Mich. Price: 50 cents.

The Ohio State Highway Department's snow and ice removal equipment consists of approximately 1,150 dump trucks, 775 aggregate spreaders, 250 motor graders and 775 snow plows, placed throughout the entire state and available for day and night service.

A Portion of Conte-Eastwood's Batching Plant Set-Up on Its 1937 Lincoln Highway Contract

Batcher Set-Up On Small Space

Conte-Eastwood, Inc., Handled 38,000 Tons of Aggregate With Crane Running on Platform

✦ LAST summer Conte-Eastwood, Inc., contractor of Pittsburgh, Pa., paved 4½ miles of the Lincoln Highway east of Pittsburgh. This work, Section 10A-B-C on Route 120, consisted of 40-foot reinforced concrete roadways and included 196,000 cubic yards of excavation and required drainage.

When it came to designing the set-up for the 120-ton Blaw-Knox batching plant, the contractor experienced considerable trouble in securing sufficient ground space to assemble the plant properly, as there was only one practical location available for the project. The available siding permitted spotting fourteen loaded aggregate cars and the railroad company designated midnight and 1:00 P. M. as the hours for shifting in order to take care of the requirements of the job.

Since the railway tracks were approximately 8 feet higher than the stockpile sites, it was necessary to construct a running platform for the crane. This was erected of large timbers built up to the elevation of the track and immediately adjacent to it. In the center of the running space for the crane, the bins were placed. On either side of the bins was storage space where approximately five cars of sand and ten to twelve cars of crushed gravel were stockpiled. These stockpiles approximated the daily consumption of the plant during concrete construction.

In connection with this batching set-up, one pit was used for dumping the coarse aggregate and another with a 24-inch Barber-Greene belt conveyor used for unloading sand from the railroad cars. The small space available made it necessary for the Lorain-40 crane to remove the coarse aggregate from the pit or to handle the sand from the end of the belt conveyor for each and every car as well as to feed the batcher bin. The crane had a 35-foot boom and a ¾-yard Williams clamshell bucket. A number of construction men who visited the plant when it was first placed in operation stated quite frankly that it could not possibly serve the two Koehring 27-E pavers operating back to back pouring the same 10-foot concrete paving lane.

The set-up did work and it worked well, for the daily allotment of material was unloaded from railroad cars, keeping the stockpiles replenished and 6-bag batches totaling 584 were weighed out in 10½ hours paving time for an average of 55.6 batches per operating hour. The variation of batches for the entire project shows a consumption per operating day varying between 425 and 525 batches. The Butler bulk cement bins handled a total of 37,000 barrels of cement on this job.

After the first two or three days of paving, this batching plant set-up operated very smoothly and at no time during the paving period, according to R. R. Garretson, Construction Engineer, Conte-Eastwood, was there any delay due to failure of the plant to deliver and it is believed that the equipment involved could have worked to a greater capacity if it had been possible to use the material at the pavers.

The engineering design of the set-up was most important and particular attention was paid to the elevated platform or runway for the crane which was designed to permit forward or backward movement to a set point with the bins located at a point where the radius swing from either pit or from the stockpile did not require a change of the position of the crane boom.

Dust Collecting System For Dry-Drilling Jobs

Because of the tremendous publicity that has been given to silicosis, particularly in tunnel operations, steps have been taken by the New York State Department of Labor to test various methods of removing this hazardous dust from the air. In ordinary methods of drilling, dust is removed from its source at the bottom of the drill hole by means of an air stream, delivered through the hollow dry steel where dry drilling is used. This dust is dispersed in all directions as it emerges into the atmosphere and, in down-hole work, much of the dust falls back into the drill hole and is reground under the bit.

The Kadco Corp., 45 Rockefeller Plaza, New York City, has developed a system of dust control consisting of a dust-collecting hood, a dust line, a dust collector and separator and a source of power. The dust-collecting hood, attached to the drill, checks the escape of the dust-laden air from the drill hole and directs this stream into the dust line which connects several dust-collecting hoods to a common suction. The air velocity through the dust line is maintained at a rate sufficient to carry the dust to the collector.

The collector or separator is large enough to provide dust storage space for four hours of continuous operation without excessive filter resistance. The Kadco separator is composed of two stages of primary and mechanical separation and one filtering stage. A centrifugal exhauster driven by an electric motor or gasoline engine is used to supply the vacuum for the removal of the dust from the hoods and dust lines.

Spray Controls-Air Operated from Cab; Lighter Weight, Feature New Kinney Distributor.

The Kinney Manufacturing Co., 3531 Washington St., Boston, Mass., made an instant hit at the Road Show with their new Bituminous Distributor.

For the Owner, faced with the desire of operating at a profit, the new air control of spray from cab (or platform); and the much lighter alloy steel tank—reducing dead weight by 1000 pounds on a 1000 gallon unit!—proved decidedly interesting.

To the Engineer, interested in accurate application, Kinney representatives emphasized the quick-starting; full spray even at the end nozzles; large-capacity Kinney pump; efficient heating unit, and tachometers.

Of direct interest to the Operator were the safety and easy handling features: fuel tank well away from the burners; ladders, and hand rails; relief valves and vents, and the inside closing valve.

Of general interest to all was the fact that Kinney Engineers had relied on proved equipment—Westinghouse Standard Air Brake diaphragms to control spray; and Ford 60 H.P. engine for which service is universally available.

Complete details of this new Distributor are covered in new Bulletin A-1938—which the Kinney Mfg. Co. will gladly mail to interested parties.

(Advertisement)

The New Jaeger Road-Builder

New Road Builder For Low-Cost Roads

The interest in low-cost roads and in the process of stabilization has resulted in considerable study of the materials and machines necessary to give the best results, by both highway engineers and manufacturers of road-building equipment.

One of the new pieces of equipment in this field shown at the Road Show in Cleveland was the mix-in-place Road Builder made by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. This Model MP-2 self-propelled unit combines a distributor, pugmill mixer and spreader finisher in one unit for heavy retread and stabilized road bases, using materials brought to the grade or, on certain types of stabilization, earth taken directly from the grade which has previously been scarified. As the machine travels forward on crawlers, steered through individual clutches, two gathering plows move the loose material from the windrow toward the gathering screws. These double threaded helical gathering screws are mounted on an extension of the twin pugmill shafts and draw the material into the pugmill at a rate up to 70 cubic feet a minute. The bottom of the mixing chamber is a heavy steel plate carried only a few inches above the ground so that the material is not lifted for mixing.

A feature of this new Road Builder is that it applies accurately-measured bituminous binder as the road material is gathered and mixed, all in one pass. The handling equipment consists of two 3-inch rotating oil pumps of 20 to 75-gpm capacity, an auxiliary engine for driving the pumps, and two storage tanks, each of 275 gallons capacity, which are connected and operate as one tank. The rear pump takes binder material from the supply tank to the storage tanks on the machine. The front pump jets the binder in a measured quantity from the tanks to the front end of the pugmill. Tachometer dial readings, one showing the speed of forward travel and the other the rate of discharge of binder into the pugmill, permit accurate measurement of the amount of binder required and being applied.

The twin continuous-type pugmill is 48 inches wide, 7½ feet long and is equipped with twin force-feeding screws 24 inches long. The mixing paddles are clamped to a square shaft, adjustable as to position, individually removable, and equipped with removable wearing tips made of manganese molybdenum steel, heat-treated. The right and left-hand remixing and spreading screw is mounted at the rear of the mixing unit and is vertically adjustable so that, by means of an adjustable rudder, the flow of material is directed to either side. The leveling unit is attached to the mixer unit through a connection on each side which permits the leveling unit to float independently of the mixer unit so that the 21-foot long side runners or straightedges average any irregularities in the road surface and equalize the height of the strike-off screed mounted therein. It is adjustable in width from 10 to 12 feet between the runners.

Power for the Road Builder is furnished by a 150-hp 4-cylinder radiator-cooled heavy-duty gasoline engine, equipped with an electric starter.

New Booklets on Quarry Equipment

Diamond roller-bearing roll crushers, roller-bearing jaw crushers, various types of screens, and portable belt conveyors and accessories are described in a new series of catalogs issued by the Diamond Iron Works, Inc., Minneapolis, Minn. These units may be purchased separately or in combination to meet the special requirements of any rock-crushing or aggregate-preparation job.

Copies of any or all of these catalogs may be secured by interested contractors or state and county highway engineers direct from the company by mentioning this magazine.

New President Elected For Linn Mfg. Corp.

At a recent meeting of the Board of Directors of The Linn Mfg. Corp., Morris, N. Y., the resignation of George Whitman as President was accepted with regret and F. R. Van Rensselaer, formerly Vice President, was elected President to succeed Mr. Whitman. Philip W. Sloan was elected Vice President to succeed Mr. Van Rensselaer. The Linn Mfg. Corp. is widely known for its crawler drive tractors.

Auxiliary Transmissions

Watson-Brown-Lipe auxiliary transmissions are described and illustrated in a new bulletin just issued by the H. S. Watson Co., 1145 Harrison St., San Francisco, Calif. In addition to photos and descriptions of the new models, this bulletin contains tables of gear ratios and speeds of auxiliary transmission applications to all trucks. Copies of this publication may be secured direct from the manufacturer by mentioning this magazine.

C. & E. M. Photo

Texture of an Alabama Double Treatment Road Surface Before Sealing

Surface Treatment On Ala. Highways

(*Continued from page 5*)

This material was applied at 0.42 gallon per square yard.

Right behind the distributor, slag from 1¼-inch down to ½-inch was laid down on the surface with spreader boxes on the rear of trucks that backed over the freshly applied asphalt. The layer was just 1¼ inches thick and weighed 44 pounds per square yard. This was broomed with a gang broom, consisting of three rows of brooms diagonal to the road, pulled by a truck. The gravel and the slag for the surface were hauled by Mitchell's own fleet of new International C35 trucks with 3-yard bodies built up to 4-yard for the slag. The slag was furnished by the Birmingham Slag Co. and was unloaded from the hopper-bottom cars into a pit from which a Fairfield conveyor loaded the trucks direct.

After the slag was spread and broomed it was rolled with a 6½-ton Galion gas roller with pneumatic-tired rear wheels which do the steering. The drive is on the front roller through a chain and the weight of rolling is controlled by the amount of water in the front roll. Traffic was turned onto the road at once after the rolling was completed. There was a maximum delay of 30 minutes to traffic from the application of the asphalt through the spreading of the slag, brooming and rolling. Wherever a detour was available traffic was sent around the detour to avoid delay.

Traffic was permitted on the road for a period of one week and then a power broom was used to remove all loose slag that had not already been whipped to the shoulder by the traffic. The slag was stockpiled for the use of the State Highway Department later for maintenance.

The Seal

The seal coat consisted of 0.2 gallon per square yard of RC-2 applied by the Kinney distributor and then ⅜-inch and smaller screen sizes of slag, No. 8, was spread by the same boxes and the surface broomed with another type of broom built to the specifications of the Alabama Highway Department. This broom is 6 feet wide and has converging brooms set diagonally at the front, forming an open V with the wide part forward. This is followed by a closed V with the point in the opening of the first. Behind the second V is a straight boom across the back and behind that a clapboard drag. This broom does a fine job of moving the loose chips back and forth so that they have a chance to find a crevice into which they may fit.

When the brooming was completed the contractor shot the surface again 20 feet wide with RC-2 at the rate of 0.22 gallon per square yard and remixed with the broom but without the addition of any more fine slag. The final operation was the rolling of the surface with the 6½-ton roller using oil on the rolls to prevent picking up of the asphaltic material.

Sand cover was hand-cast from a backing truck immediately behind the roller at the rate of 8 pounds per square yard. Traffic went onto the road at once.

The shoulders were dressed to line and grade by hand. The gravel shoulder was carried in both cuts and fills and on top to the drainage ditches. The drainage ditches were 6 inches deep and 8 feet wide with a 3-foot flat bottom minimum up to 2 feet deep and 12 feet wide with a variable flat bottom.

As a further measure to insure the success of the road surface the surface material was spread out to additional widths of from 2 to 10 feet on all drives, depending on the grade, to keep gravel from being carried in to the black top and causing ruptures.

Major Quantities

The major quantities and their unit prices for the contract which was awarded for $149,030 were:

Item	Quantity	Unit Price
Common excavation	100,000 cu. yds.	0.28
Channel excavation	500 cu. yds.	0.70
Overhaul	75,000 yd.-stations	0.015
Grassing (sod)	66,000 sq. yds.	0.03
Gravel base course	40,975 cu. yds.	0.68
Bituminous prime	34,975 gals.	0.11
Hot application bit. material	31,980 gals.	0.09
Seal	27,480 gals.	0.10
Coarse aggregate cover	1,777 tons	3.00
Fine aggregate cover	719 tons	3.50
18-in. cast iron pipe (culvert)	780 feet	2.50
24-in. cast iron pipe (culvert)	471 feet	3.50
18-in. heavy cast iron pipe	99 feet	3.00
24-in. heavy cast iron pipe	78 feet	4.00
18-in. vitrified clay pipe	152 feet	2.00
15-in. concrete pipe, Class B	510 feet	1.40
18-in. concrete pipe, Class B	528 feet	1.50
24-in. concrete pipe, Class B	20 feet	2.25

Three bridges

One—10 x 6-foot double reinforced concrete culvert

One—timber boat and reinforced concrete deck with twelve 22-foot spans, one 34-foot reinforced concrete deck girder span.

One—widening and surfacing of four 26-foot span 6-inch reinforced concrete deck girder spans.

Personnel

This 5.942-mile contract, the grading on which started November 9, 1936, was awarded to Mitchell Bros. Construction Co. of Birmingham, Ala. Work was completed and placed on 30-day maintenance on August 18, 1937, and given final acceptance by the State on September 21, 1937. O. O. Mitchell was in charge of the work for the contractor and L. A. Burleson was Resident Engineer for the Alabama Highway Department.

A New Pictorial Catalog On Road Building Equipment

Catalog No. 1706, describing and illustrating the complete line of Austin-Western road machinery, including motor and drawn graders, hydraulic and cable scrapers, elevating graders, road rippers, Badger shovels, Roll-A-Plane road rollers, crushing and screening plants, bituminous distributors, fresnos, snow plows, dump cars and miscellaneous equipment, has just been issued by the Austin-Western Road Machinery Co., Aurora, Ill.

Copies of this interesting pictorial booklet may be secured by contractors and state and county highway engineers direct from the manufacturer.

Wire Cords and Cables

A new kind of illustrated wire manual designed to provide wire and cable data and specifications has recently been announced by the Wire Division, United States Rubber Products Co., 1790 Broadway, New York City. The manual not only provides readers with specific data on U. S. wire products but shows, by means of comparative tests, the merits and features of each.

Included in the contents of this booklet "U. S. Royal Cords and Cables," copies of which may be secured direct from the manufacturer by mentioning this magazine, is information on the following subjects: charts of tests, extra-flexible welding cable, general specifications on Laytex Royal cord and U. S. portable cables, oil-resisting cord, laboratory tests on sheath, performance tests and the uses of U. S. Royal cords and cables.

Barge Canal Branch Being Built in N. Y.

(*Continued from page 27*)

area, piling it up to the desired height above water level.

A Well-Drill Section

The Battle Island Cut, as already indicated, is being widened from its present width of slightly over 100 feet to the standard river section of 200 feet between bottom angles. This has meant not only a large yardage of rock excavation where the rock surface was well above water, but the rehandling of the spoil from the excavation of the old canals which had been cut through here.

The stripping of earth and old spoil was completed and the rock excavation of the east side of the Battle Island Cut was finished before the canal froze in the fall of 1936. The work on the west side of the cut was done in the 1937 open season.

Well-drilling was subcontracted to L. de Dominicis & Bros., of Torrington, Conn. Three of the most up-to-date types of truck-mounted well drills were in action. One was a Star, one a Keystone and one a Loomis Clipper. They all drilled rapidly in spite of the clay partings or bedding seams in the rock which tended to cause sticking of the bits and all have proved economical and dependable.

Six-inch holes were drilled 4 feet below the 14-foot plane. As the rock surface ranged from zero to 4 feet above normal pool elevation, the holes were 18 to 22 feet deep. They were spotted 10 feet apart in rows which were parallel to the cut and 12 feet apart. Four rows of holes thus covered the 50-foot width of the strip to be excavated along most of the west side of the cut. Every hole was mapped on a large scale map and its depth and collar elevation checked before blasting.

EARTH AND ROCK YARDAGES, CONTRACT U.S.-14

	Excavation above 14-foot Plane, Including Slopes		*Excavation between 14-foot and 15-foot Planes*	
	Earth, cubic yards	*Rock, cubic yards*	*Earth, cubic yards*	*Rock, cubic yards*
Item 1	24,294	7,333	3,051	18,167
Item 2	5,970	7,964	1,312	6,651
Item 3	109,585	2	71,192	125
Item 4	81,334	97,210	3,912	17,934
Item 5	5,750	4,498	7,014	8,258
Item 6	10,460	26,087	547	12,911
Item 7	634	2,039	1,073	6,108
Item 8	609	0	480	0
Item 9	4,600 linear feet drilling line holes.			
Totals	241,427	145,133	88,491	62,154

Earth, 329.8 8 cub.c yards
Rock, 207,287 cubic yards
Total, 537,115 cubic yards

The explosive used here was 40 per cent strength Ammonia Gelatin in 4½ by 16-inch cartridges. This was loaded about 125 pounds to a hole. In one shot of 52 holes, 6,500 pounds of powder were used. Every hole was carefully stemmed with earth.

Delay electric blasting caps were used with usually three or four holes on each of the ten different delays. The holes were connected in series and fired by means of a blasting machine.

The 52-hole blast just referred to gave excellent results. There was no fly rock, and fragmentation was satisfactory. It was believed that the well-drill blasting practice described would be followed through the remainder of the Battle Island Cut with but little change. Earlier, and on the east side of the cut, several shots were more heavily loaded. As a consequence, fragmentation was good but some rock was thrown into the channel. This necessitated a careful survey of the channel with the sweep raft to be sure no boulders projected above the desired depth, followed by the removal of any high rocks thus found. On the other hand, underloading produces oversize boulders, as the rock has a serious tendency to break in thick, flat slabs. The 112-pound-to-a-hole charge, which works out at about 1.6 pounds to a cubic yard, is about the minimum for this reason.

Personnel

Besides the men already mentioned as responsible for the various phases of the Barge Canal improvement program in general and Contract U. S. 14 in particular, mention should be made of Paul B. Chase, Engineer in Charge for the State of New York, and LeRoy Jackson, representative of the War Department. Acknowledgment is made to *The Explosives Engineer* for the use of portion of its longer article on this work, and also for the photographs reproduced.

New Convertible Shovel With Box-Type Boom

A new convertible shovel, crane and dragline has been announced by Lima Locomotive Works, Inc., Lima, Ohio. When the Lima Type 650 is used as a shovel it is equipped with a 1½-yard dipper, a 21-foot boom and a 17-foot dipper handle. The shovel boom is of the box-type design, electrically welded throughout. The dipper handle is of the same type of construction. This new convertible machine is available with either gas, diesel, oil or electric power units. Only three levers and two foot pedals are necessary to control the three major operations, hoist, swing and crowd. Each major operation is independent of the other, which makes it possible to hoist, travel, swing and raise or lower the boom simultaneously.

The drum laggings are split and are easily changed to fit any line speed. Helical cut gears are used throughout and, to further the efficiency of the Type 650, roller bearings are used at all vital bearing points.

The crawler truck is composed of a one-piece base casting with four through axles, on the ends of which revolve eight open-type self-cleaning rollers. The crawler truck has an end drive with a drive chain located back under the crawler treads. Steering is accomplished with the upper frame in any position, which is helpful when propelling in close quarters. The crawlers are so designed that they can be extended in length to increase the ground bearing area. The change from short crawlers to long crawlers can be made without dismantling the machine. The cab has an in-built winter front of shatter-proof glass. More than one-half of the area of the cab can be opened for ventilation in hot weather.

Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Power for Dirt Moving

540 International Harvester Co., 180 N. Michigan Ave., Chicago, Ill., has just issued a new 32-page pamphlet "Dirt-Moving with International TracTracTors" showing how these crawler tractors provide money-making power for bulldozers, wheel scrapers, fresnos, graders, dump wagons, tampers and terracers. The Bulletin is well illustrated and is filled with cost data and production figures from contractors and highway officials.

New 1¼-Yard Excavator

541 Bulletin X-31, describing the features of the new P & H Model 555 1¼-yard heavy-duty excavator, may be secured by interested contractors and engineers direct from the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

Stationary Asphalt Plants

542 H & B stationary asphalt mixing plants, in a variety of styles and capacities to meet the requirements of the individual, are described and illustrated in Bulletin T-252 which Hetherington & Berner Inc., 701-745 Kentucky Ave., Indianapolis, Ind., manufacturer of asphalt paving machinery for over 40 years, will be glad to send on request.

1938 Motor Trucks

543 Literature on the Chevrolet 1938 trucks in ½, ¾, 1 and 1½-ton capacities and five wheelbase lengths and in a number of models to suit various hauling requirements, may be secured direct from the Chevrolet Motor Division, General Motors Sales Corp., Detroit, Mich.

Tractor Scrapers

544 The Austin-Western Road Machinery Co., Aurora, Ill., has recently issued a new bulletin, No. 1680, describing and illustrating the features of Austin-Western 5-yard tractor scrapers and including specifications, which those interested may secure direct from the manufacturer.

Asphalts and Road Oils

545 Specifications and other information on Socony asphalts and road oils for all types of bituminous road construction and maintenance may be secured by interested contractors and state and county highway engineers from the Standard Oil of New York Division, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.

Direct-Lift Bulldozers

546 The direct-lift feature of Baker bulldozers and Gradebuilders, as well as other information on their construction and use in road work, is described in literature which may be secured from the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill.

Combined Blade and Rotary Plow

547 The Rotoblade, a combination blade and rotary-type snow plow for truck mounting, having the speed of the blade type and the effectiveness of the rotary, is described in literature which the Snow Removal Equipment Co., 400 Seventh St., San Francisco, Calif., will be glad to send on request.

Free Catalog on Wellpoints

548 Griffin wellpoint systems, a feature of which is the water inflow through the entire screen circumference, are described and illustrated in a new catalog "Pointed Wellpoint Facts," free copies of which may be secured from the Griffin Wellpoint Corp., 725 E. 140th St., New York City.

Improved Pavement Breaker

549 Complete details of the improved truck-mounted pavement breaker for breaking out concrete, asphalt, macadam or frozen ground which is made by the Concrete Cutting Corp. of America, 607 Degraw St., Brooklyn, N. Y., may be secured direct from that company.

Heavy-Duty Trailers

550 A new bulletin describing and illustrating the complete line of Jahn heavy-duty trailers, in a variety of sizes and models to meet all types of transportation requirements, has recently been issued by the C. R. Jahn Co., Builders Bldg., Chicago, Ill., which will be glad to send copies on request.

Pumps for Construction Jobs

551 Jaeger Sure-Prime pumps in 2 to 10-inch sizes and capacities of 7,000 to 200,000-gph are described in a new catalog which the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, will send on request.

Wear Insurance for Buckets

552 One of the features claimed for Owen buckets is the long wear built into these units. This and other features of this line of buckets for digging and material-handling jobs are described in a new catalog which the Owen Bucket Co., 6030 Breakwater Ave., Cleveland, Ohio, will send on request.

Wheelbarrows and Carts

553 Sterling Wheelbarrow Co., Milwaukee, Wis., will be glad to send to those interested complete information on its No. 6 concrete cart with 6-cubic foot capacity, as well as on its other concrete carts and wheelbarrows.

Ditching in Tough Places

554 The Buckeye Model 120 ditcher, which will handle jobs 16 to 30 inches wide and to 10-foot depths and is designed for those hard-to-get-at places, is described in a special bulletin which may be secured direct from the Buckeye Traction Ditcher Co., Findlay, Ohio.

Tractor Lubrication

555 The features of the new Alemite Volume Pump for lubricating the track rolls of tractors are described in literature which may be secured without obligation from the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill.

All-Steel Hand Hoists

556 Beebe Bros., 2724 Sixth Ave., So., Seattle, Wash., will be glad to send on request complete information on its line of all-steel hand hoists which are made in 2, 5 and 15-ton sizes.

Vibrators and Surfacers

557 Mall concrete vibrators and surfacers, with gas-engine, air or electric power, are described in bulletins which the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill., will be glad to send on request.

Bulletins and Pamphlets

(Continued from preceding page)

New Bituminous Distributor

558 Complete information on the features of the new Etnyre Black Topper bituminous distributor may be secured by interested contractors and state and county highway engineers from E. D. Etnyre & Co., Oregon, Ill.

Line of Snow Plows

559 State and county highway engineers may secure complete information on the Frink line of snow plows from Carl H. Frink, Clayton, 1000 Islands, N. Y.

A New 1-Yard Excavator

560 Complete information on the new 29-B 1-yard shovel, crane, dragline, clamshell and dragshovel, with gasoline, diesel or electric power, and a number of new modern features, may be secured by those interested from the Bucyrus-Erie Co., South Milwaukee, Wis.

Complete Line of Road Rollers

561 The Buffalo-Springfield Roller Co., Springfield, Ohio, manufacturer of road rollers for 47 years, will be glad to send to interested contractors and state and county highway engineers complete information on its line of road rollers for road construction and maintenance.

Engines and Power Units

562 Hercules gasoline and diesel engines and power units, designed to meet the heavy-duty service requirements of the construction industry, are described in literature which the Hercules Motors Corp., Canton, Ohio, will send on request.

Clamps for Concrete Forms

563 Williams Form Engineering Corp., 1244 Prospect Ave., S. E., Grand Rapids, Mich., will be glad to send to interested contractors complete information on Williams form clamps for concrete jobs.

Bulletin on Hydraulic Scrapers

564 A new 8-page bulletin No. RM-300, describing the new line of Heil Dig-N-Carry hydraulic scrapers for dirt-moving jobs, is yours for the asking by writing direct to the Heil Co., 3000 W. Montana St., Milwaukee, Wis.

Modern Hauling Units

565 The Rogers Model D-50-D 50-ton drop-deck trailer for heavy-duty machinery hauling is described in an illustrated catalog which Rogers Bros. Corp., 108 Orchard St., Albion, Penna., will send on request.

Water-Cooled Air Compressors

566 Gardner-Denver Co., Quincy, Ill., will be glad to send to those interested complete information on its line of Gardner-Denver water-cooled portable air compressors for construction jobs.

Free Catalog on Road Rollers

567 A new descriptive catalog on the Huber line of road rollers from 5 to 10 tons with gasoline or diesel power may be secured by interested contractors and state and county highway engineers from the Huber Mfg. Co., Marion, Ohio.

A New Trailer Welder

568 Bulletin W-10 describing the new P & H-Hansen Smootharc trailer welder, a 150-ampere portable unit for fabrication, maintenance or repair work on the job, may be secured direct from the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

Dependable Pumps for Contractors

569 Sterling pumps for every purpose ranging in size from 1¼ to 10 inches, are described in a new catalog which may be secured direct from the Sterling Machinery Corp., 411-13 Southwest Blvd., Kansas City, Mo.

Line and Surface Levels

570 Sand's Level & Tool Co., 8531 Gratiot Ave., Detroit, Mich., will be glad to send to interested highway contractors and engineers complete information on the Sand's-Stevens line and surface level, a special feature of which prevents accidental detachment from the line.

Crushed Stone for Roads

571 Bulletin E-34 describing Telsmith quarry and gravel pit equipment for use on road jobs may be secured by those interested direct from the Smith Engineering Works, 4014 No. Holton St., Milwaukee, Wis.

Motor Graders for Road Work

572 Rome motor graders, in a variety of models to meet the requirements of road grading, construction and maintenance, are described in bulletins which the Rome Grader & Machinery Corp., Rome, N. Y., will be glad to send on request.

Barrows, Carts and Salamanders

573 Jackson Mfg. Co., Harrisburg, Pa., manufacturer of pressed-steel-tray wheelbarrows, concrete carts, salamanders and similar equipment, will be glad to send to interested contractors and engineers copies of its Catalog No. 32, describing and illustrating its complete line of products for construction jobs.

Pile Hammers and Extractors

574 McKiernan-Terry pile hammers and extractors, as well as the hoists, derricks, whirlers and movable bridge machinery made by this company, are described in literature which the McKiernan-Terry Corp., 19 Park Row, New York City, will send on request.

Valves for Hydraulic Control

575 Vickers Multiple Unit heavy-duty-type hydraulic valves for the control of road-building and maintenance equipment, dump-truck hoists, snow removal equipment, excavating machinery, industrial trucks and other construction equipment are described in detail in Bulletin 36-13 which may be secured from Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich.

Bulletin on New 6-Inch Pump

576 Bulletin CEM-38, describing the new Marlow 6-inch heavy-duty pump for wellpoint service, bridge pier holes or similar jobs where large capacity is required, may be secured free on request from Marlow Pumps, Ridgewood, N. J.

Winter Construction Heaters

577 A free bulletin No. 144-C, describing Aeroil winter construction heaters including oil-burning water heaters, smokeless salamanders and thawing torches may be secured direct from the Aeroil Burner Co., Inc., West New York, N. J.

Lubricants for Construction Jobs

578 Trained lubrication engineers are available for consultation on the selection and application of Texaco lubricants for construction equipment by writing to the Texas Co., 135 E. 42nd St., New York City, and mentioning this magazine.

Complete Line of Buckets

579 The Hayward Co., 32-36 Dey St., New York City, will be glad to send to those interested complete information on its line of Hayward clamshell, dragline, electric-motor and orangepeel buckets for digging and rehandling jobs.

Bins and Batchers Booklet

580 Copies of the new 48-page booklet, known as Catalog 1566 and describing and illustrating the operating details and uses of Blaw-Knox bins and batchers on concrete construction projects and in construction material yards may be secured direct from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa.

Bituminous Material Distributors

581 Complete information on South Bend bituminous material distributors for bituminous road construction and maintenance may be secured by interested contractors and state and county highway engineers from the Municipal Supply Co., South Bend, Ind.

Road Mats and Tarpaulins

582 Information on Fulton road mats for concrete curing, tarpaulins and windbreaks may be secured by interested contractors from the Fulton Bag & Cotton Mills, Atlanta, Ga.

New Catalog on Road Equipment

583 A new condensed catalog describing and illustrating the line of Adams 1938 road equipment, including leaning-wheel and motor graders, and the Adams Retread Paver for bituminous work, may be secured free on request from the J. D. Adams Co., Indianapolis, Ind.

Control Feature of Shovels

584 The Speed-o-Matic control feature of Link-Belt shovels, as well as their other features of design and performance, is described in literature which the Link-Belt Co., 300 W. Pershing Road, Chicago, Ill., will send on request.

Concrete Mixers for 1938

585 The features of the new Rex modern drum concrete mixers are described in bulletins which the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., will be glad to send on request.

Heavy-Duty Shovels

586 Complete information on Northwest heavy-duty shovels, built in a range of eighteen sizes of ⅜-yard capacity and larger, with gasoline, electric, diesel or oil-engine power, may be secured direct from the Northwest Engineering Co., 1730 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.

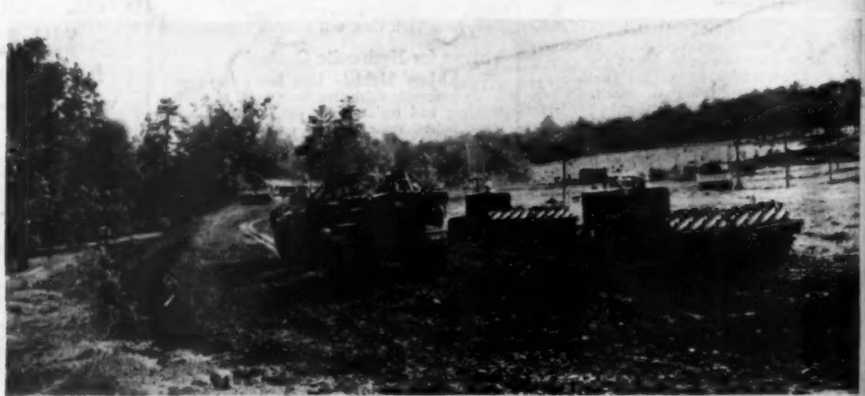
C. & E. M. Photos

Within the Cofferdam for Mississippi River Lock 24 Being Built by Central Engineering Co. Shots from Left to Right: One of the Sump Pumps; Pulling Some Emergency Steel Sheet Piles; the Clyde-Wiley Steam Crane; One of the Koehrings Handling a Form Panel; and Loading the Ice Box. See Page 1.

Working on the Rock Pile. A Bucyrus-Erie Loads Out Rock While a Drilling Unit Consisting of Drill and Gardner-Denver Compressor on a Caterpillar Diesel Operates on the Other Side for Harry T. Campbell Near Frederick, Md.

The Hydraulic Dredge G. A. McWilliams Used by the McWilliams Dredging Co. of New Orleans for Levee Building in the Atchafalaya Basin in Louisiana in 1937. See Page 32 for One of the Series of Articles Describing the U. S. Engineering Department's Flood Control Program in This Section.

A Mile Up and Many Miles from Headquarters, This Radio-Equipped Rotary Snow Plow Is in Direct Communication with the State Highway Office in Olympia. Note the Heavily-Constructed Antenna Support. See Page 2.



The Big Parade Back and Forth Across the Ever-Rising Top of the Earth Dam of the Distribution Reservoir for the New Industrial Water Supply for Birmingham, Ala. Big Scrapers Hauled and Spread the Dirt in Uniform Layers and Tandem Sheepsfoot Rollers Finally Compacted It to Form a Water-Tight Embankment. See Page 28.

C. & E. M. Photo

Other Tractors with Bulldozers and Harrows Evened Up the Layers of Earth and Broke Down All Clods Between the Spreading and Final Compaction. At the Left, a Section of the Steel Pipe Line Which Connects the Impounding Reservoir at Inland, Ala., with the Distribution Reservoir at Pawnee, a Suburb of Birmingham.